

# INDEX OF STANDARD "ROADWAY" DRAWINGS

AS OF NOVEMBER 1, 1969

Index will NOT be revised (or issued) for every revision to Drawings. It may be kept up to date by the Individual as revised drawings are released.

\* These drawings shall NOT be shown or called for on Construction Plans.

STANDARD DRAWING NO.	DATE	DISCRIPTION
* DM-2	Nov. 1, 1961	Design Methods- Resurfacing; Typical Sections
* DM-3	Nov. 1, 1961	Design Methods- Resurfacing, Building-Up, Run-Out, Quantities
* DM-4	Nov. 1, 1961	Design Methods- Construction & Reconstruction C.A.B.C.-A & B
* DM-5	Nov. 1, 1961	Design Methods- Construction & Reconstruction C.A.B.C.-AP
* DM-6	Nov. 1, 1961	Design Methods- Sub-Base for Pavement Widening
* DM-10	Feb. 15, 1966	Design Methods- Lighting- Urban Cloverleaf
* DM-11	Feb. 15, 1966	Design Methods- Lighting- Urban Diamond
* DM-12	Feb. 15, 1966	Design Methods- Lighting- Urban Trumpet
* DM-15 (2 sheets)	April 3, 1962	Design Methods- Speed Change Lanes
* DM-17 (5 sheets)	Nov. 9, 1965	Design Methods- Interstate Cl. 1, Cl. 2, Cl. 3, Cl. 4 & Cl. 5 Roadway
* E-2	Nov. 1, 1961	Design Methods- Borrow, Excavation, Embankment, Etc.
E-5 (2 sheets)	Feb. 24, 1969	Classification of Earthwork
E-6	Aug. 8, 1969	Backfill at Structures
B-1	April 11, 1969	Reinforced Cement Concrete Pavement
B-2 (5 sheets)	Mar. 7, 1969	Standard Types of Reinforcement
* B-2 Special	Nov. 1, 1961	Emergency Reinforcement-(Special Permission Only)
B-3 (2 sheets)	Jan. 6, 1969	Bridge Approach Slabs
B-4	Jan. 6, 1969	Pavement Relief Joint
* Type C	Sept. 10, 1964	Load Transfer Units- Behringer Metal Works Inc.
* Type E	Mar. 28, 1962	Load Transfer Units- Electric Weld Co.
* Type G	Mar. 28, 1962	Load Transfer Units- Bethlehem Steel Co.
* Type H	Mar. 28, 1962	Load Transfer Units- Pittsburgh Steel Products
* Type I	April 14, 1966	Load Transfer Units- Bethlehem Steel Co.
* Type J	Sept. 28, 1965	Load Transfer Units- Electric Weld Co.
* Type K	July 12, 1966	Load Transfer Units-
* Type L	Sept. 30, 1966	Load Transfer Units- Jones & McKnight Inc.
* Type M	Mar. 11, 1968	Load Transfer Units- U.S. Steel Corp.
SD-1	Nov. 1, 1961	Class B Concrete Endwalls, Types A & B Tree Walls
SD-2	Nov. 1, 1961	Cem. Rub. Masry Endwalls, Tree Walls, F-1 & F-2 (Conc.) Endwalls
SD-6 (2 sheets)	Nov. 1, 1961	Types A, B, C, & D Manholes
SD-7	Oct. 14, 1969	Special Mortared Stone Slope Wall.
SD-8	Feb. 5, 1968	Standard Details- Slope Walls
SD-10	Feb. 5, 1968	Standard Details- Curbs & Gutters
SD-11	April 4, 1969	Standard Details- Slope Protection
SD-12	Feb. 5, 1968	Standard Details- Miscellaneous
SD-13 (2 sheets)	Feb. 5, 1968	Concrete Mountable Curbs
SD-14 (2 sheets)	Feb. 5, 1968	Standard Details- Sub-Surface Drains
SD-15	Feb. 24, 1969	End Sections for Pipe Culverts
SD-16	July 22, 1968	Types 1, 2, & 3 Right-of-Way Fence
SD-20	Mar. 21, 1969	Highway Lighting- Foundations
SD-21	Feb. 5, 1968	Highway Lighting- Junction Boxes Light Duty
SD-22	Feb. 5, 1968	Highway Lighting- Junction Boxes Heavy Duty
SD-23	Jun. 27, 1969	Highway Lighting- Lighting Pole Details
SD-24	Jun. 27, 1969	Highway Lighting- Lighting & Electrical Details
SD-30	Nov. 1, 1961	Class B Concrete Endwalls, Types A & B Tree Walls
Std. Inlets	Nov. 1, 1961	Types A, B, C, D, E, & F Inlets
City Inlets	Nov. 1, 1961	Nos. 1, 2, & 3 Open Mouth City Inlets
S. 1, 4 & 6	Nov. 1, 1961	Types 4 Ft., 6 Ft., 4 Ft. Special & 6 Ft. Special Inlets
Misc. Inlets	May 8, 1968	Types H, H Modified & J Inlets
* Misc. Inlets A	July 20, 1955	Supplemental Sheet: Alternate Grates for Type H Inlets
GR-1	Feb. 5, 1968	Type 1-B Guard Rail
GR-2 (3 sheets)	July 18, 1968	Type 2-A & 2-B Guard Rail
MB-1 (2 sheets)	Oct. 15, 1969	Box Beam Median Barrier
MB-2 (4 sheets)	July 22, 1969	Type 2C Median Barrier
MB-3 (2 sheets)	Nov. 20, 1968	Concrete Median Barrier
MC-1	Feb. 5, 1968	Metal Cribbing Coated
MC-2	Feb. 5, 1968	Metal Cribbing Uncoated
CC-1 (2 sheets)	Feb. 5, 1968	Concrete Cribbing
LD-1	Jan. 6, 1969	Planting Guides
LD-2	Jan. 6, 1969	Roadside Fence
SK-465	Jan. 31, 1941	Metal Type Covered Gutters

CLASS OF HIGHWAY		INTERSTATE	CLASS 1		CLASS 2	CLASS 3	CLASS 4	CLASS 5
AVERAGE DAILY TRAFFIC (1)		ALL TRAFFIC (2)	OVER 13,000 (2)	5,000 TO 13,000 (2)	1500 TO 5,000	800 TO 1500	200 TO 800	0 TO 200
DESIGN SPEED		70 M.P.H. (3)	70 M.P.H. (3)		60 M.P.H. (3)	60 M.P.H. (3)	50 M.P.H.	40 M.P.H.
WIDTH OF PAVEMENT FOR MOVING TRAFFIC (4)	BETWEEN SHOULDERS OR PAVED PARKING LANES	4 OR MORE 12 FT. LANES DIVIDED	4 OR MORE 12 FT. LANES DIVIDED		2-12 FT. LANES	22 FT.	30 FT.	18 FT. (5)
	BETWEEN RAISED CURBS	4 OR MORE 12 FT. LANES DIVIDED 3 FT. OFFSET FROM BARRIER CURBS	4 OR MORE 12 FT. LANES DIVIDED 2 FT. OFFSET FROM BARRIER CURBS RIGHT 1 FT. OFFSET FROM BARRIER CURB LEFT IN RELATION TO DIRECTION OF TRAFFIC		2-14 FT. LANES	2-12 FT. LANES	2-12 FT. LANES	-
MINIMUM WIDTH OF SHOULDERS WITHOUT RAISED CURBS		10 FT. EXCAVATION SECT. 12 FT. EMBANKMENT SECT. (10 FT. PAVED) (6)	10 FT. EXCAVATION SECT. 12 FT. EMBANKMENT SECT. (PAVED OR STABILIZED) (6) (7)		10 FT. EXCAVATION SECT. 12 FT. EMBANKMENT SECT.	6 FT. EXCAVATION SECT. 8 FT. EMBANKMENT SECT.	6 FT. EXCAVATION SECT. 8 FT. EMBANKMENT SECT.	6 FT. EXCAVATION SECT. 8 FT. EMBANKMENT SECT. (8)
MINIMUM WIDTH OF SHOULDERS WITH RAISED CURBS (MEASURED FROM BACK OF CURB) (9)		SPECIAL DESIGN	3 FT. EXCAVATION SECT. 4 FT. EMBANKMENT SECT.		3 FT. EXCAVATION SECT. 4 FT. EMBANKMENT SECT.	3 FT. EXCAVATION SECT. 4 FT. EMBANKMENT SECT.	3 FT. EXCAVATION SECT. 4 FT. EMBANKMENT SECT.	3 FT. EXCAVATION SECT. 4 FT. EMBANKMENT SECT.
WIDTH OF PAVED PARKING LANES (10 FT. WHEN FEASIBLE)		-	MINIMUM 8 FT.		MINIMUM 8 FT.	MINIMUM 8 FT.	MINIMUM 8 FT.	MINIMUM 7 FT.
WIDTH OF MEDIAN		RURAL - MINIMUM 36 FT. (10) URBAN 20 FT. (11)	RURAL - MINIMUM 44 FT. (11) BUILT UP AREAS - MINIMUM 10 FT. DIVISOR 16 FT. OR 20 FT. EARTH MEDIAN DESIRED		-	-	-	-
NORMAL ROADWAY SIDE SLOPES (SLOPES AS INDICATED OR FLATTER)		UNDER 4 FT. - 6:1 4 FT. TO 10 FT. - 4:1 OVER 10 FT. - 2:1	UNDER 4 FT. - 6:1 4 FT. TO 10 FT. - 4:1 OVER 10 FT. - 2:1		2:1	2:1	1 1/2:1	1 1/2:1
MAXIMUM GRADE		3% (12) (13)	3% (12) (13)		4% (13)	4% (13)	5% (13)	2% (14)
MAXIMUM HORIZONTAL CURVE		3° 30'	3° 30'		5° 00'	5° 00'	7° 30'	12° 30'
MINIMUM SIGHT DISTANT (HORIZONTAL & VERTICAL)	PASSING	-	(15)		2100 FEET	2100 FEET	1700 FEET	1300 FEET (16)
	STOPPING	600 FEET	600 FEET		475 FEET	475 FEET	350 FEET	275 FEET (16)
TYPE AND THICKNESS OF PAVEMENT STRUCTURE	RIGID	REINFORCED CONC. PAVT	SPECIAL DESIGN		10" UNIFORM	9" OR 10" UNIFORM (17)	9" UNIFORM	9" UNIFORM
		BITUMINOUS SURFACE	SPECIAL DESIGN		MINIMUM 2 1/2" (17)	MINIMUM 2 1/2" (17)	-	-
		PLAIN CONCRETE BASE	SPECIAL DESIGN		9" OR 10" TYPE "A" (18)	9" TYPE "A"	9" TYPE "A"	-
		SUB-BASE	SPECIAL DESIGN		MINIMUM 6"	MINIMUM 6"	MINIMUM 6"	MINIMUM 6"
	FLEXIBLE	PLANT-MIX SURFACE	SPECIAL DESIGN		MINIMUM 2 1/2"	MINIMUM 2 1/2"	MINIMUM 2 1/2"	MINIMUM 2 1/2" (18)
		PENETRATION SURFACE	SPECIAL DESIGN		-	-	3"	2" TO 3"
		BASE	SPECIAL DESIGN		MINIMUM 12"	MINIMUM 10"	10" OR 12"	8" OR 10"
		SUB-BASE	SPECIAL DESIGN		MINIMUM 8"	MINIMUM 6"	MINIMUM 6"	MINIMUM 6" (19)
GUARD FENCE		BEAM		TYPE I-B OR BEAM FOR LIMITED ACCESS		TYPE I-B	TYPE I-B	TYPE I-B
ROADWAY WIDTH OF BRIDGES WHERE ADJACENT APPROACH PAVEMENT IS NOT CONFINED BETWEEN CURBS (20) (21) (22)	0' TO 250'	SPECIAL DESIGN		PAVED SECTION PLUS 10' RIGHT 6' LEFT (DUAL) PAVED SECTION PLUS 20' (SINGLE)		40 FT.	34 FT.	32 FT.
	250' TO 1000'	SPECIAL DESIGN		PAVED SECTION PLUS 4' RIGHT 4' LEFT (DUAL) PAVED SECTION PLUS 8' (SINGLE)		32 FT.	30 FT.	28 FT.
	1000' AND OVER	SPECIAL DESIGN		SPECIAL DESIGN		SPECIAL DESIGN	SPECIAL DESIGN	SPECIAL DESIGN
STRUCTURES PLACED UNDER EMBANKMENTS SHALL PROVIDE FOR		GRADED SECTION		GRADED SECTION		GRADED SECTION	GRADED SECTION	GRADED SECTION
MINIMUM RIGHT ANGLE SPAN OF STRUCTURE OVER HIGHWAY (UNDERPASS) (23)		PAVED SECTION PLUS PAVED SHOULDER		PAVED SECTION PLUS USABLE SHOULDER		PAVED SECTION PLUS USABLE SHOULDER	PAVED SECTION PLUS USABLE SHOULDER	PAVED SECTION PLUS USABLE SHOULDER
MINIMUM RIGHT OF WAY		FLAT & ROLLING - 200' + MED. MOUNTAINOUS - 300' + MED. (24)		FLAT & ROLLING - 200' + MED. MOUNTAINOUS - 300' + MED. (24)		80 FT.	80 FT.	60 FT. (25)

- 1 CLASSIFY HIGHWAYS ON THE BASIS OF THE ANNUAL AVERAGE DAILY TRAFFIC FOR THE CURRENT YEAR PLUS TWENTY YEARS GROWTH EXCEPT THAT TEN YEARS GROWTH MAY BE USED FOR SAVIAGE PROJECTS
- 2 FOR VALUES OF ADT GREATER THAN 20,000 AND FOR CRITICAL VOLUMES AT INTERSECTIONS AND INTERCHANGES REFER TO HIGHWAY CAPACITY MANUAL. SEE TABLE II - 12, PAGE 91 AASHO - RURAL AND TABLE C-2, PAGE 125 AASHO - URBAN.
- 3 TOPOGRAPHY AND/OR URBAN CONDITIONS MAY WARRANT DESIGN SPEEDS OF 60 OR 50 M.P.H. IN SPECIFIC LOCATIONS.
- 4 GRADE CROSSING PAVING SHALL EXTEND 2 FEET BEYOND THE OUTSIDE RAILS FOR THE FULL GRADED WIDTH OF THE HIGHWAY.
- 5 A 14 FOOT SURFACED WIDTH FOR TOWNSHIP AND SERVICE ROADS MAY BE PROVIDED WHICH SERVES ONLY ONE PROPERTY.
- 6 MEDIAN SHOULDER: 8 FEET WIDE (4 FEET STABILIZED) OUTSIDE SHOULDER: USE 12 FOOT SHOULDERS IN EXCAVATION, WHEN NO SWALE IS USED.
- 7 PAVED SHOULDERS 10 FEET WIDE WHERE APPROVED BY CHIEF ENGINEER.
- 8 IN MOUNTAINOUS TERRITORY, WHERE TRAFFIC IS LESS THAN 100 PER DAY, SHOULDERS MAY BE REDUCED TO 4 FEET. WHERE TRAFFIC IS LESS THAN 100 PER DAY, GRADES MAY EXCEED 9 PERCENT AND SIGHT DISTANCE MAY BE ADJUSTED AS REQUIRED.
- 9 ADDITIONAL WIDTH SHALL BE PROVIDED WHERE PEDESTRIAN TRAFFIC REQUIRES. A WIDTH OF 2 FEET BACK OF CURBS SHALL BE PROVIDED WHERE CURB BACKING ONLY IS DESIRED IN SHALLOW EXCAVATION OR EMBANKMENT SECTIONS (NOT PAVABLE AS SHOULDERS)
- 10 PROVIDE FOR DESIRED 64 FOOT MEDIAN ON INTERSTATE UNDER NORMAL CONDITIONS IN FLAT OR ROLLING TERRAIN AND 60 FOOT MEDIAN FOR ROUGH TERRAIN. ANY MEDIAN OVER 300' WILL REQUIRE APPROVAL OF THE CENTRAL OFFICE.

- 11 PROVIDE FOR SEPARATE GRADES AND ALIGNMENT WHERE CONDITIONS WILL PERMIT.
- 12 ADJUST FOR DESCENDING GRADES; INCREASE BY ONE PERCENT.
- 13 TWO PERCENT INCREASE IN GRADIENT MAY BE PROVIDED IN RUGGED TERRAIN.
- 14 WHEN ONLY TWO LANES ARE TO BE CONSTRUCTED INITIALLY, PROVIDE FOR PASSING SIGHT DISTANT.
- 15 USE 10 INCH UNIFORM WHEN TRUCK TRAFFIC EXCEEDS 1000.
- 16 USE 10 INCH TYPE "A" WHEN TRUCK TRAFFIC IS ABNORMALLY HIGH.
- 17 USE SPECIAL BINDER WHERE 4 INCH BITUMINOUS SURFACE IS FOUND FEASIBLE BY ECONOMIC ANALYSIS.
- 18 USE SELECTED MATERIAL SURFACING WHERE SPECIFIED.
- 19 PROVIDE FOR SUB-BASE WHEN SOIL ANALYSIS WARRANTS.
- 20 WHERE PAVED AND CURBED PARKING LANES EXIST OR HAVE BEEN APPROVED FOR CONSTRUCTION ON APPROACHES, THE CLEAR ROADWAY OF THE PROPOSED BRIDGE IN EACH CASE WILL BE DETERMINED BY THE CENTRAL OFFICE UPON RECEIPT OF DISTRICT ENGINEER'S RECOMMENDATION.
- 21 PROVIDE FOR 6 FOOT 6 INCH (MINIMUM) "SAFETY CURB" FOR ROADWAYS WHEN WIDTHS LESS THAN SHOULDERS ARE CARRIED ACROSSED STRUCTURE. WHERE NECESSARY PROVIDE FOR 5 FOOT SIDEWALKS. WHERE FULL SHOULDER IS CARRIED OVER STRUCTURE USE A 9 INCH BRUSH CURB.
- 22 ALL OVERPASSES, WITH MEDIANS 36 FEET AND OVER, SHALL BE DUAL BRIDGES.
- 23 PIERS MAY BE PROVIDED IN MEDIANS OF 20 FEET OR LESS, WHEN APPROVED BY THE CENTRAL DESIGN OFFICE. INCREASE SPAN WHERE NECESSARY TO PROVIDE FOR REQUIRED HORIZONTAL STOPPING SIGHT DISTANCE. PROVIDE FOR CLEARANCE FOR GUARD FENCE IN FRONT OF SUBSTRUCTURES IF PROTECTION IS REQUIRED.
- 24 IN URBAN OR BUILT UP AREAS THE REQUIRED WIDTH OF RIGHT OF WAY MAY BE REDUCED TO 120 FEET PLUS MEDIAN WHERE FOUND ECONOMICALLY FEASIBLE.
- 25 THE MINIMUM REQUIRED RIGHT OF WAY FOR SERVICE AND TOWNSHIP ROADS SHALL BE 40 FEET.

GENERAL NOTES

THIS CHART WILL BE USED AS A GUIDE IN THE DESIGN OF NEW PROJECTS AND IN THE IMPROVEMENT OF THE EXISTING SYSTEM. WHERE DESIRABLE CRITERIA ARE NOT APPLICABLE, APPROVAL OF THE CENTRAL DESIGN OFFICE WILL BE REQUIRED.

A DESIGN DESIGNATION INDICATING THE MAJOR CONTROLS OR SERVICES FOR WHICH THE HIGHWAY IS DESIGNED, SHOULD BE SHOWN ON THE TITLE SHEET OF THE CONSTRUCTION PLANS.

THE BASIS OF DESIGN WILL BE THE CURRENT POLICIES OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS AND THE "HIGHWAY CAPACITY MANUAL" PUBLISHED BY THE HIGHWAY RESEARCH BOARD.

THE MINIMUM TANGENT DISTANT BETWEEN REVERSE CURVES SHALL BE OF SUFFICIENT LENGTH TO EFFECT TRANSITION OF SUPERELEVATION RUNOFF (SEE DESIGN STANDARD C-97) MAXIMUM SUPER-ELEVATION RATE = 0.08 FOOT PER FOOT.

AVOID PLACING THE BEGINNING OR ENDING OF HORIZONTAL CURVES NEAR SUMMIT OF GRADE.

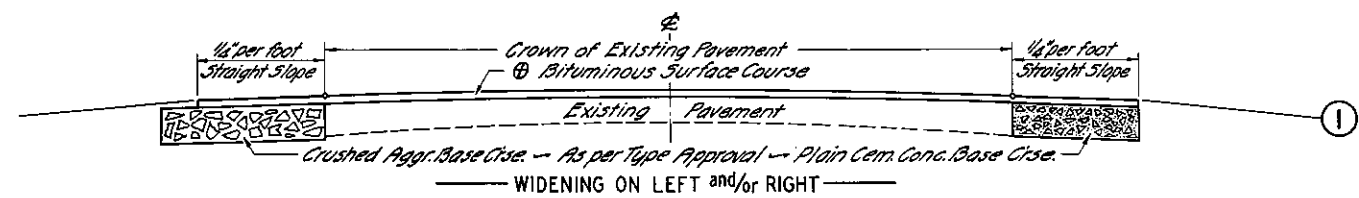
IT IS DESIRABLE TO ELIMINATE PLACING SPIRALS AND/OR SUPERELEVATION TRANSITIONS ON STRUCTURES.

MINIMUM VERTICAL CLEARANCE FOR STRUCTURES OVER:-  
 DEFENSE ROUTED HIGHWAYS - 16 FEET 6 INCHES  
 OTHER HIGHWAYS - 14 FEET 6 INCHES  
 ELECTRIFIED RAILROADS - 23 FEET 6 INCHES  
 OTHER RAILROADS - 22 FEET

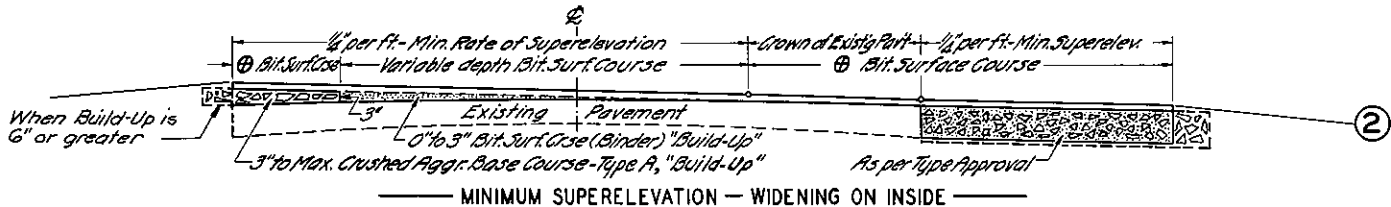
Subject to Safety Criteria C-2466-2

APPROVED SEPTEMBER 28<sup>th</sup> 1964  
*C. Dawson Beckley*  
 DIRECTOR OF HIGHWAY DESIGN

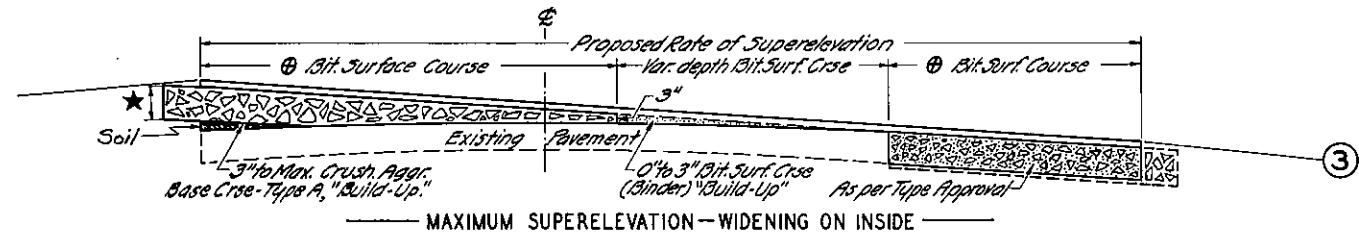
APPROVED SEPTEMBER 28<sup>th</sup> 1964  
*W. H. ...*  
 DEPUTY SECRETARY AND CHIEF ENGINEER



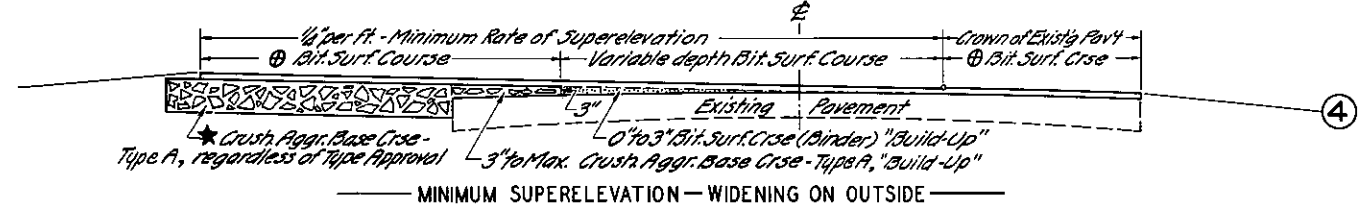
ON TANGENT ALIGNMENT



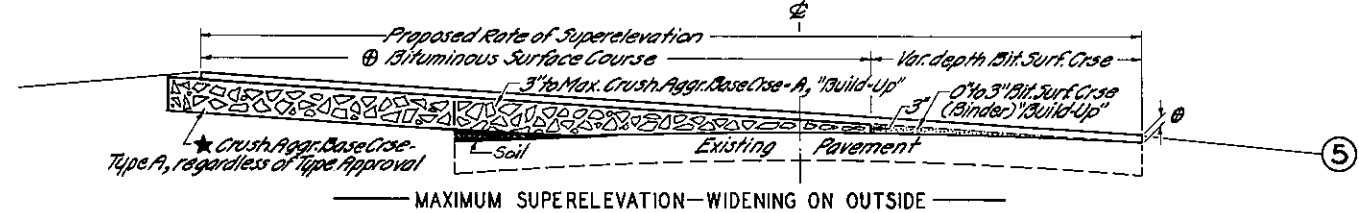
MINIMUM SUPERELEVATION - WIDENING ON INSIDE



MAXIMUM SUPERELEVATION - WIDENING ON INSIDE

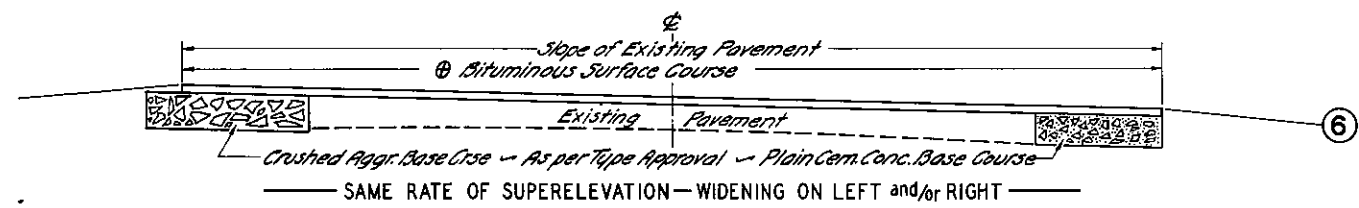


MINIMUM SUPERELEVATION - WIDENING ON OUTSIDE

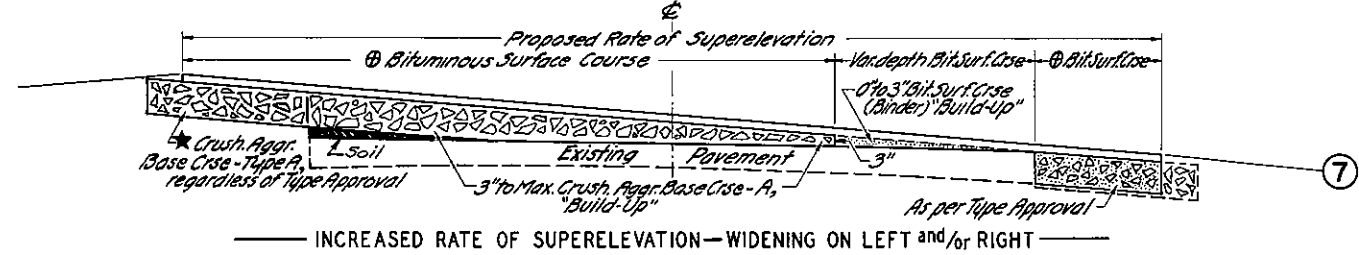


MAXIMUM SUPERELEVATION - WIDENING ON OUTSIDE

ON NON-SUPERELEVATED CURVES

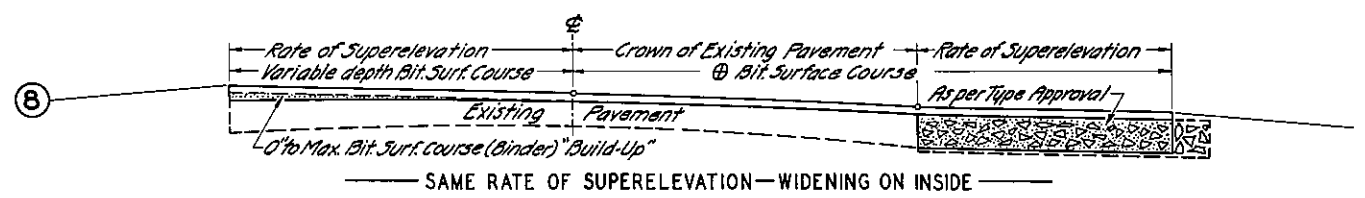


SAME RATE OF SUPERELEVATION - WIDENING ON LEFT and/or RIGHT

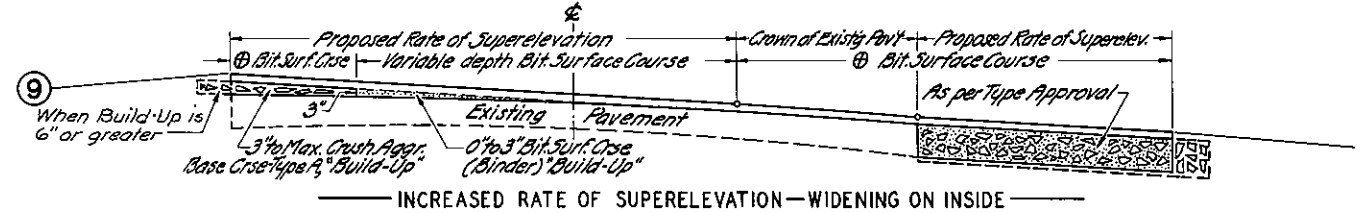


INCREASED RATE OF SUPERELEVATION - WIDENING ON LEFT and/or RIGHT

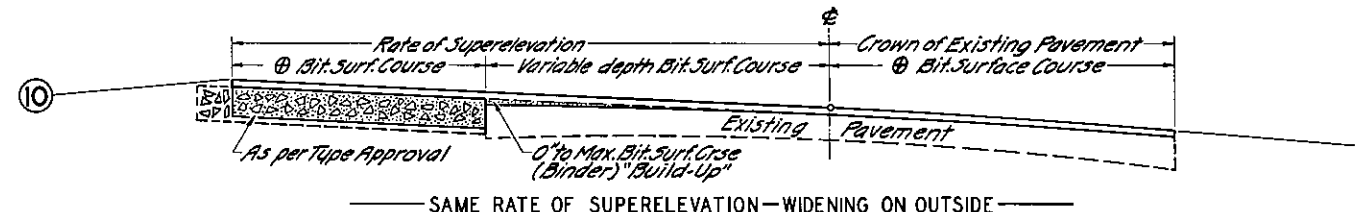
ON SUPERELEVATED CURVES WITH CROWN REMOVED



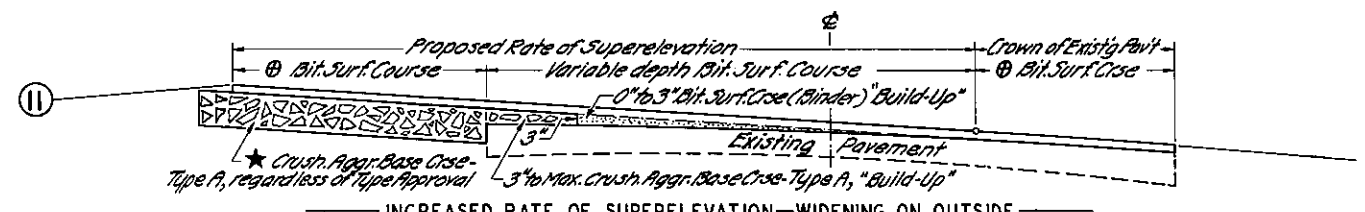
SAME RATE OF SUPERELEVATION - WIDENING ON INSIDE



INCREASED RATE OF SUPERELEVATION - WIDENING ON INSIDE

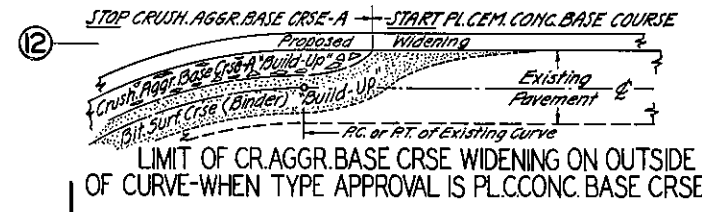


SAME RATE OF SUPERELEVATION - WIDENING ON OUTSIDE

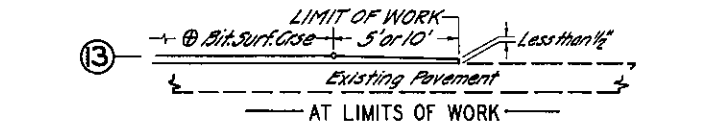


INCREASED RATE OF SUPERELEVATION - WIDENING ON OUTSIDE

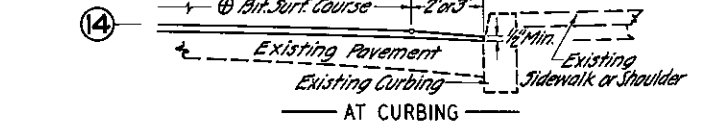
ON SUPERELEVATED CURVES WITH CROWN



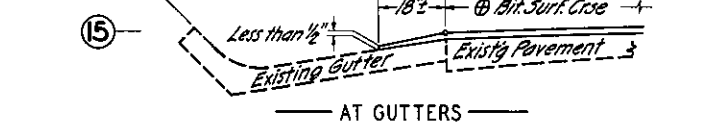
LIMIT OF CR. AGGR. BASE CRSE. WIDENING ON OUTSIDE OF CURVE - WHEN TYPE APPROVAL IS PL. CONC. BASE CRSE



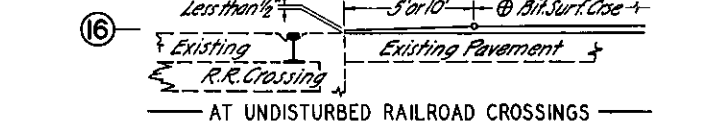
AT LIMITS OF WORK



AT CURBING



AT GUTTERS



AT UNDISTURBED RAILROAD CROSSINGS

MISCELLANEOUS ADJUSTMENTS

**NOTES**

"Existing Pavement" indicated on this sheet represents the original pavement width plus any subsequent widening.

When the superlevation of existing pavement is increased by 1/4 inch per foot only, the "Build-Up" shown on sketches 7, 9, 11 and 12 will consist entirely of Bit. Surf. Course (Binder) and the widening shown on sketches 7, 11 and 12 shall be in accordance with the "Type Approval".

Additional materials for correcting surface irregularities in the existing pavement shall be provided as follows:-

- 2% of the "Build-Up" quantity of Crush. Aggr. Base Crse - Type A.
- 3% of the quantity of Bit. Surf. Course - based on the surface area of the existing pavement.

For projects involving resurfacing only, disregard all widening shown on this sheet.

⊕ indicates Uniform Depth as specified in the Type Approval Letter.

★ indicates 10" depth, except 12" when Type Approval Letter specifies Concrete or 12" depth Crushed Aggregate widening.

Omit base course "lips" adjacent to PAVED SHOULDERS.

Revised to indicate maximum depth of Crushed Aggregate "Build-Up", and for NOTES.

APPROVED November 1, 1961. *Fred L. ...* CHIEF ENGINEER

Revised to designate Crushed Aggregate Base Course as TYPE A, where required by Specifications. Approved July 11, 1947. *E. P. ...* CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
**- DESIGN METHODS -**  
RESURFACING  
(WITH AND WITHOUT WIDENING)  
TYPICAL SECTIONS

APPROVED Feb. 5, 1945  
*John H. Harber*  
CHIEF ENGINEER

**DM-2**

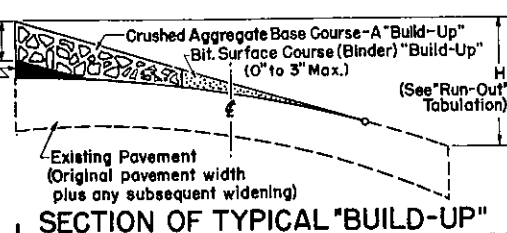
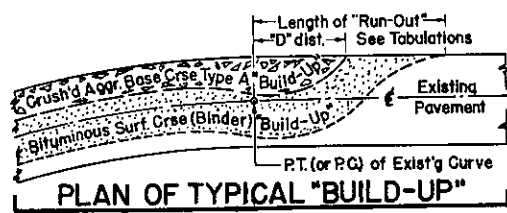
Number 61.

**"BUILD-UP" QUANTITIES - FOR SPECIFIED LENGTHS OF "RUN-OUT"**

EXISTING 16-FOOT PAVEMENT WITH 1" CROWN										EXISTING 18-FOOT PAVEMENT WITH 2" CROWN										EXISTING 20-FOOT PAVEMENT WITH 1" CROWN										EXISTING 22-FOOT PAVEMENT WITH 2" CROWN													
FOR TWO (2) RUN-OUTS					FOR TWO (2) RUN-OUTS					FOR TWO (2) RUN-OUTS					FOR TWO (2) RUN-OUTS					FOR TWO (2) RUN-OUTS					FOR TWO (2) RUN-OUTS					FOR TWO (2) RUN-OUTS													
0" to 3" depth Bituminous Surf. Crse HE or ID-2 (Binder Course)		3" to Max. Crush'd Aggr. Base Crse-A (Loose Meas.)		H (inches) between P.C. & P.T.	Run-Out Length for "Build-Up" (feet)		Proposed Rate of Superlev. (ins. per ft.)		H (inches) between P.C. & P.T.	Run-Out Length for "Build-Up" (feet)		Proposed Rate of Superlev. (ins. per ft.)		H (inches) between P.C. & P.T.	Run-Out Length for "Build-Up" (feet)		Proposed Rate of Superlev. (ins. per ft.)		H (inches) between P.C. & P.T.	Run-Out Length for "Build-Up" (feet)		Proposed Rate of Superlev. (ins. per ft.)		H (inches) between P.C. & P.T.	Run-Out Length for "Build-Up" (feet)		Proposed Rate of Superlev. (ins. per ft.)																
Stone Aggr.	Slag Aggr.	Total Cu. Yds.	Loose Meas.		Stone Aggr.	Slag Aggr.	Total Cu. Yds.	Loose Meas.		Stone Aggr.	Slag Aggr.	Total Cu. Yds.	Loose Meas.		Stone Aggr.	Slag Aggr.	Total Cu. Yds.	Loose Meas.		Stone Aggr.	Slag Aggr.	Total Cu. Yds.	Loose Meas.		Stone Aggr.	Slag Aggr.	Total Cu. Yds.	Loose Meas.	Stone Aggr.	Slag Aggr.	Total Cu. Yds.	Loose Meas.											
9.78	8.80	0.95	4	100	1/4	100	4 1/2	7.25	6.52	1.38	11.94	10.74	2.21	4 1/2	100	1/4	100	4 1/2	8.65	7.79	2.31	14.83	13.35	4.05	5	100	1/4	100	5 1/4	10.62	9.56	3.55	17.03	15.32	6.48	5 1/2	100	1/4	100	5 3/4	12.14	10.92	5.15

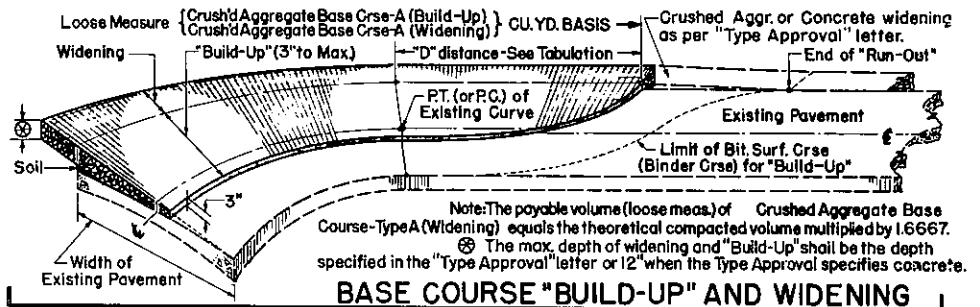
**SUPERELEVATION AND WIDENING**

Degree of Curve	Rate of Superlevation (ins. per foot) for Grades		Curve Widening - Feet (in addition to approved width of pavement)			
	6% and Under	Over 6%	For 16-ft. Pav.	For 18-ft. Pav.	For 20-ft. Pav.	For 22-ft. Pav.
0°00' to 3°00'	1/4	1/4	—	—	—	—
3°00' to 4°00'	3/8	3/8	—	—	—	—
4°00' to 5°00'	1/2	1/2	—	—	—	—
5°00' to 6°00'	5/8	5/8	—	—	—	—
6°00' to 6°30'	3/4	3/4	—	—	—	—
6°30' to 7°00'	3/4	7/8	—	—	—	—
7°00' to 8°00'	3/4	—	—	—	—	—
8°00' to 9°00'	7/8	—	—	—	—	—
9°00' to 9°30'	—	—	—	—	—	—
9°30' to 13°00'	—	—	2	2	—	—
13°00' to 26°00'	—	—	4	4	2	—
26°00' & Over	—	—	6	6	4	2



**"BUILD-UP" QUANTITIES - FOR EXISTING CURVES FROM P.C. TO P.T.**

EXIST'G 16-FT. PAVEMENT			EXIST'G 18-FT. PAVEMENT			EXIST'G 20-FT. PAVEMENT			EXIST'G 22-FT. PAVEMENT		
0" to 3" depth Bituminous Surface Crse HE or ID-2 (Binder Course)		3" to Max. Crush'd Aggr. Base Crse-A (Loose Meas.)	0" to 3" depth Bituminous Surface Crse HE or ID-2 (Binder Course)		3" to Max. Crush'd Aggr. Base Crse-A (Loose Meas.)	0" to 3" depth Bituminous Surface Crse HE or ID-2 (Binder Course)		3" to Max. Crush'd Aggr. Base Crse-A (Loose Meas.)	0" to 3" depth Bituminous Surface Crse HE or ID-2 (Binder Course)		3" to Max. Crush'd Aggr. Base Crse-A (Loose Meas.)
Tons per Lin. Ft.	Cu. Yds. per Lin. Ft.		Tons per Lin. Ft.	Cu. Yds. per Lin. Ft.		Tons per Lin. Ft.	Cu. Yds. per Lin. Ft.		Tons per Lin. Ft.	Cu. Yds. per Lin. Ft.	
With 1" Crown Retained			With 1" Crown Retained			With 1" Crown Retained			With 1" Crown Retained		
.0179	.0161	—	.0201	.0181	—	.0223	.0201	—	.0245	.0221	—



**NOTES**

BITUMINOUS SURF. CRSE (Binder Crse) "Build-Up" quantities are based on a weight of 0.0800 tons per cu. ft. using Stone as a coarse aggregate and 0.0720 tons per cu. ft. using Slag as a coarse aggregate.

CRUSHED AGGREGATE BASE COURSE - TYPE A "Build-Up" quantities are loose measure, based on the relation that one (1) cu. yd. of compacted base course requires 1.25 cu. yds. of coarse material plus 0.4167 cu. yd. of fine material, both measured loose in an approved container.

THIS STANDARD IS APPLICABLE ONLY TO PROJECTS ON WHICH THE EXISTING PAVEMENT WAS CONSTRUCTED WITH ONE-HALF (1/2) SUPERELEVATION AT THE P.C. AND P.T. OF HORIZONTAL CURVES.

**"D" DISTANCES**

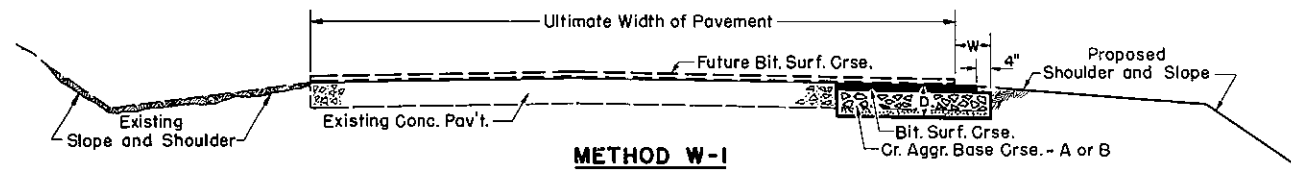
Proposed Rate of Superlev.	"D" (feet)		"D" (feet)	
(ft)	ins	ft	ins	ft
26	33	1/4	39	45
48	54	3/8	73	78
80	85	1/2	89	111
87	110	5/8	114	136
111	135	3/4	139	162
136	140	7/8	164	168
141	165	1	190	193
165	190	1 1/8	215	215
190	215	1 1/4	219	266
16' 18'	20'	22'		

Revised to show maximum depth of Crushed Aggregate "Build-Up" *November 1, 1961*  
 Approved *November 1, 1961* *[Signature]* CHIEF ENGINEER  
 Revised for Surface Course Types B for Slag Aggr. Weights *March 15, 1951*  
 Approved *March 15, 1951* *[Signature]* CHIEF ENGINEER

**COMMONWEALTH OF PENNSYLVANIA**  
 DEPARTMENT OF HIGHWAYS  
**- DESIGN METHODS - RESURFACING -**  
**"BUILD-UP" QUANTITIES TO CORRECT SUPER-**  
**ELEVATION AND "RUN-OUTS" ON PAVEMENTS**  
**PLACED PRIOR TO THE 1931 SPECIFICATIONS**

APPROVED *July 11, 1947*  
*[Signature]*  
 CHIEF ENGINEER

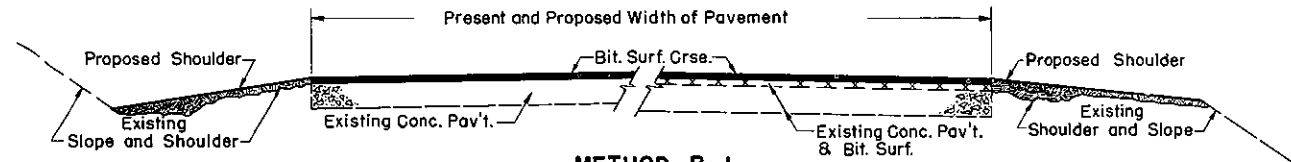




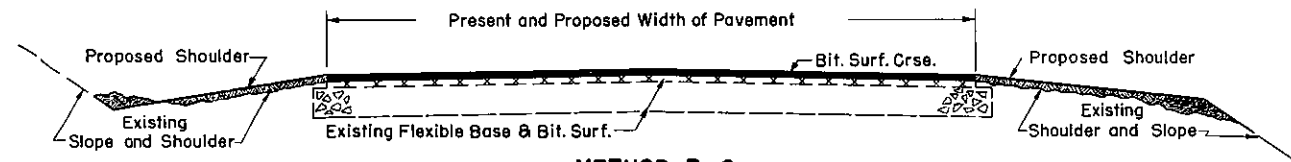
Note:- W equals D

**METHOD W-1**

**WIDENING**

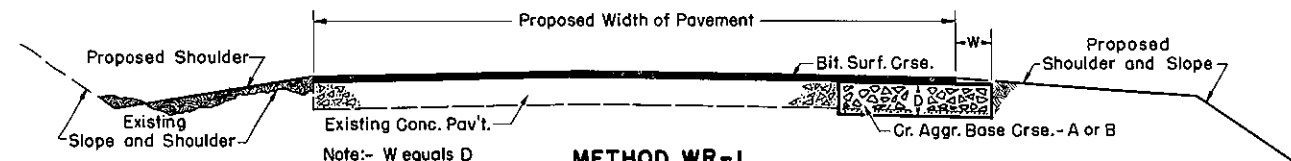


**METHOD R-1**



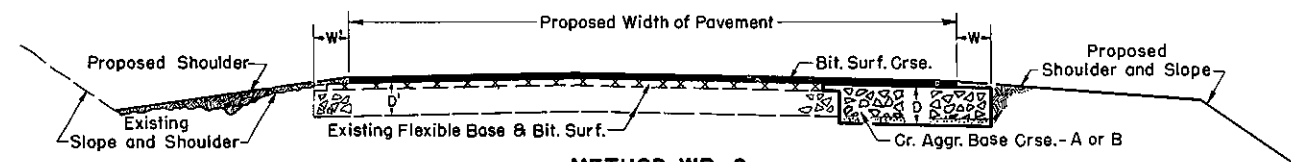
**METHOD R-2**

**RESURFACING**



Note:- W equals D

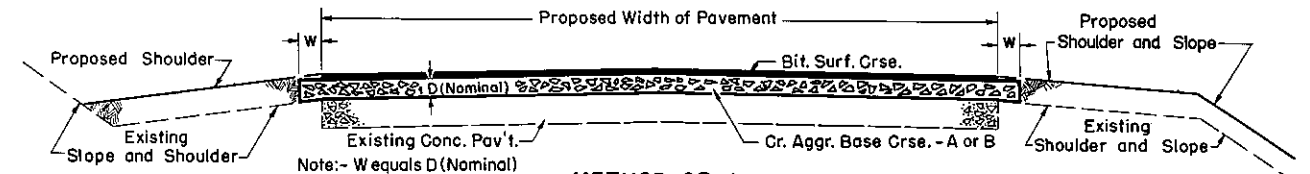
**METHOD WR-1**



Note:- W equals D  
W' equals D'

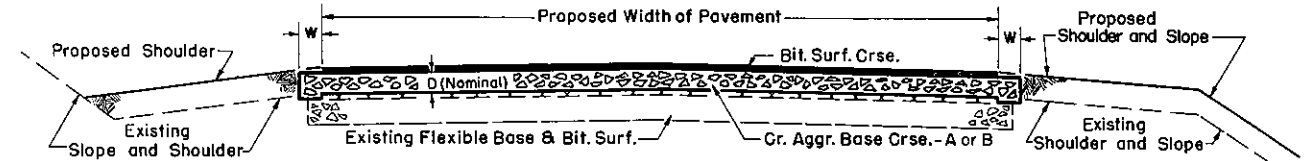
**METHOD WR-2**

**WIDENING & RESURFACING**



Note:- W equals D (Nominal)

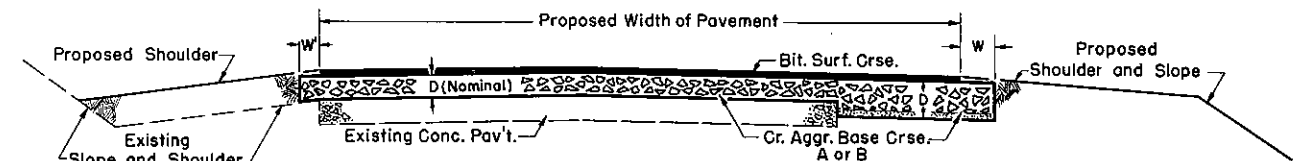
**METHOD OR-1**



Note:- W equals D (Nominal)

**METHOD OR-2**

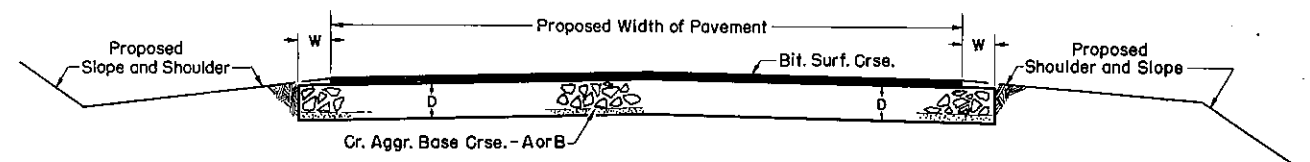
**OVERLAY & RESURFACING**



Note:- W equals D  
W' equals D (Nominal)

**METHOD WOR-1**

**WIDENING, OVERLAY & RESURFACING**



Note:- W equals D

**METHOD NC-1**

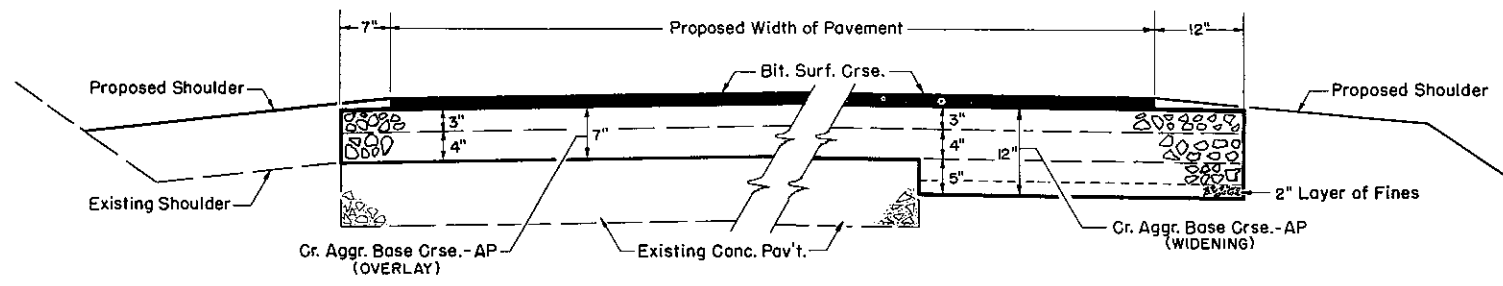
**NEW CONSTRUCTION**

— NOTES —  
Omit base course "lips" adjacent to PAVED SHOULDERS.  
\* Specified as "Special Subgrade" in SPECIFICATIONS FORM 408 DATED 1954.  
Sub-base (X), if required for widened pavements, shall be in accordance with Department Standard DM-6.  
THIS STANDARD ALSO APPLIES WHEN CRUSHED STONE BASE COURSE OR ANY TYPE OF CRUSHED AGGREGATE BASE COURSE IS USED.

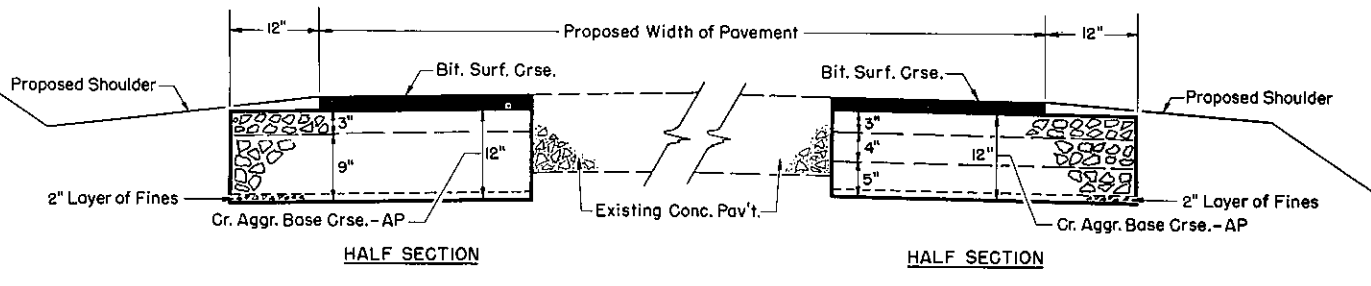
Revised for shoulder construction and "NOTES".  
APPROVED November 1, 1961 *[Signature]*  
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
— DESIGN METHODS —  
WIDENING, RESURFACING, OVERLAY  
AND NEW CONSTRUCTION WITH  
CRUSHED AGGREGATE BASE COURSE-TYPE A OR B  
AND BITUMINOUS SURFACE COURSE  
APPROVED January 6, 1953  
*[Signature]*  
CHIEF ENGINEER

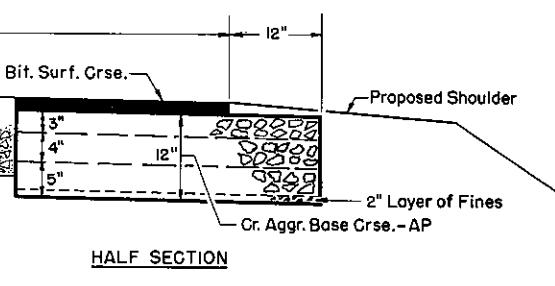
**DM-4**



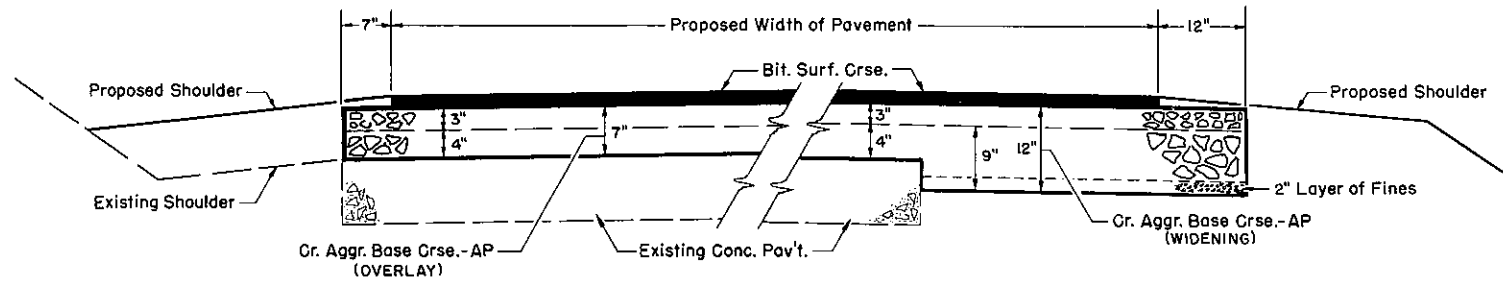
**METHOD 1**



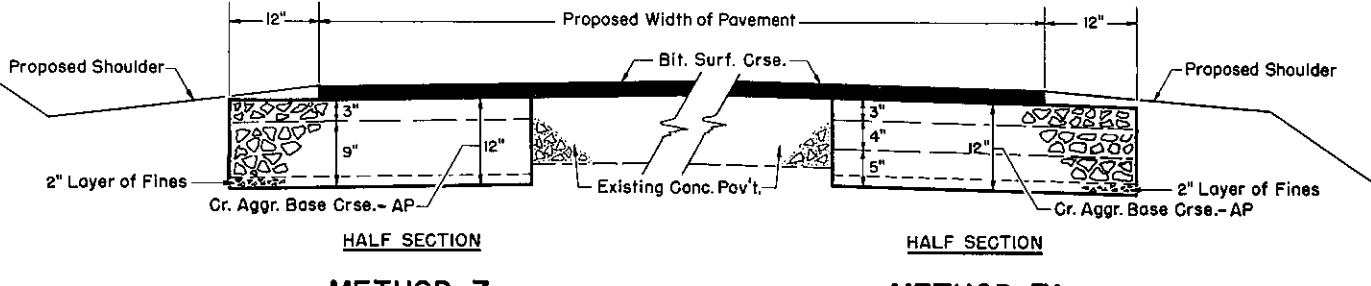
**METHOD 6**



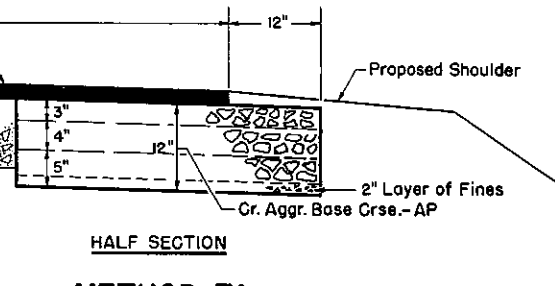
**METHOD 6A**



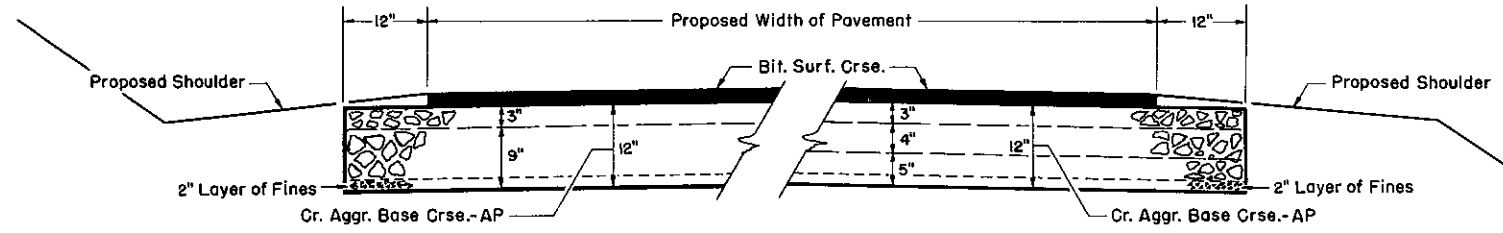
**METHOD 2**



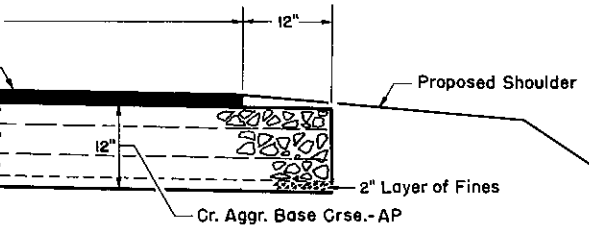
**METHOD 7**



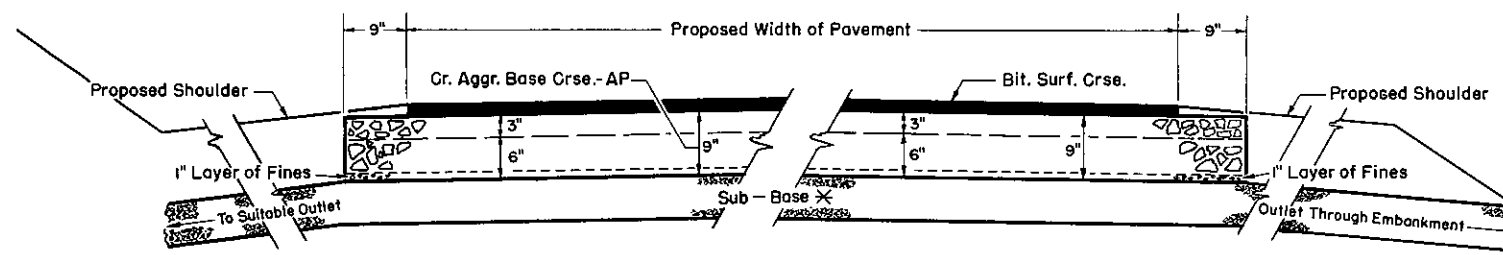
**METHOD 7A**



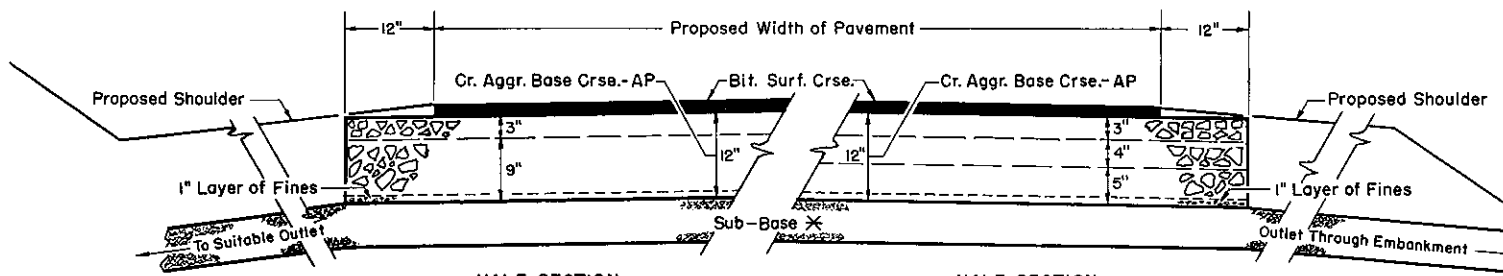
**METHOD 3**



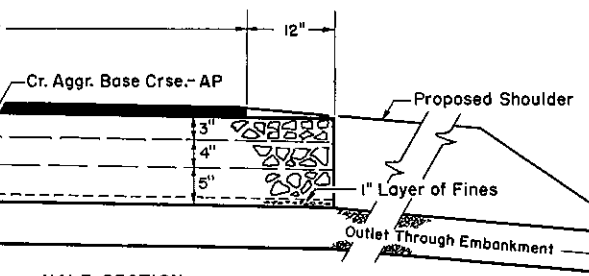
**METHOD 3A**



**METHOD 4**



**METHOD 5**



**METHOD 5A**

**NOTES**

Omit Base Course "Lips" adjacent to PAVED SHOULDERS

Crushed Aggregate Base Course-Type AP will be considered on Class 1, 2 and 3 Highways. Its use on other Class Highways will be considered only under extenuating conditions and shall be approved by the Chief Engineer.

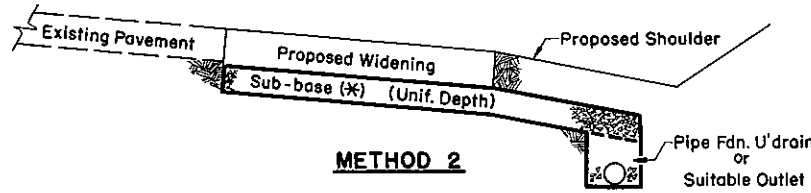
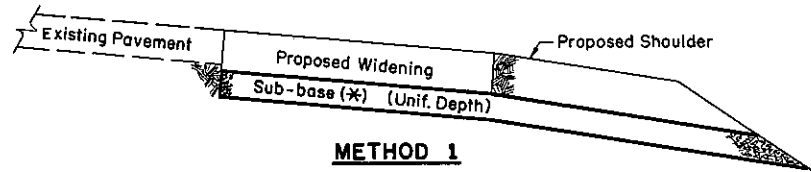
Sub-Base (X), if required for widened pavements, shall be in accordance with Standard DM-6.

(X) Specified as "Special Subgrade" in SPECIFICATIONS, FORM 408 dated 1954.

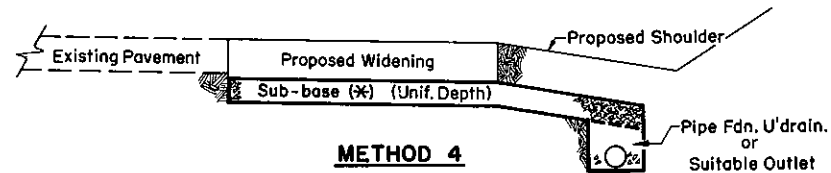
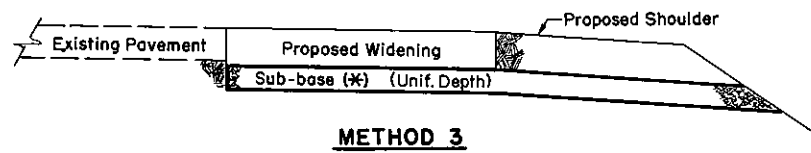
Revised for "Sub-Base" designation and for design of Crushed Aggregate Base Course - AP.  
 APPROVED *November 1, 1961*  
 CHIEF ENGINEER

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF HIGHWAYS**  
**DESIGN METHODS**  
**WIDENING, OVERLAY & WIDENING**  
**AND NEW CONSTRUCTION WITH**  
**CRUSHED AGGREGATE BASE COURSE-TYPE AP**  
**AND BITUMINOUS SURFACE COURSE**  
 APPROVED *January 6, 1953*  
 CHIEF ENGINEER

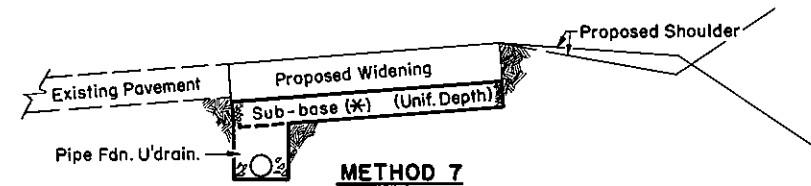
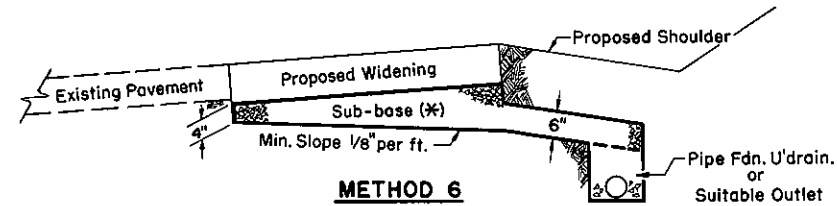
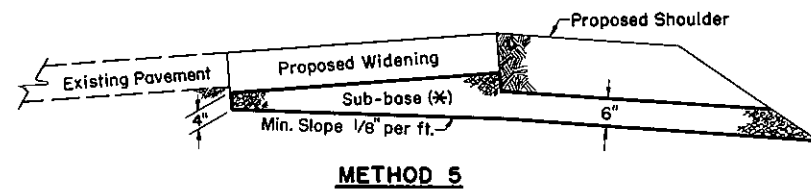
**DM-5**



**WIDENING ON INSIDE OF SUPERELEVATED CURVES**



**WIDENING ON TANGENTS**



**WIDENING ON OUTSIDE OF SUPERELEVATED CURVES**

(\*) Specified as "Special Subgrade" in SPECIFICATIONS FORM 408 dated 1954

Revised for Sub-base Designation

Approved *November 1, 1961* *Fred Johnson*  
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
— DESIGN METHODS —  
SUB-BASE (\*)  
IF REQUIRED WITH WIDENING OF PAVEMENTS

APPROVED *January 6, 1953*  
*W. B. Ruckelshaus*  
CHIEF ENGINEER

*W. B. Ruckelshaus*  
CHIEF ENGINEER

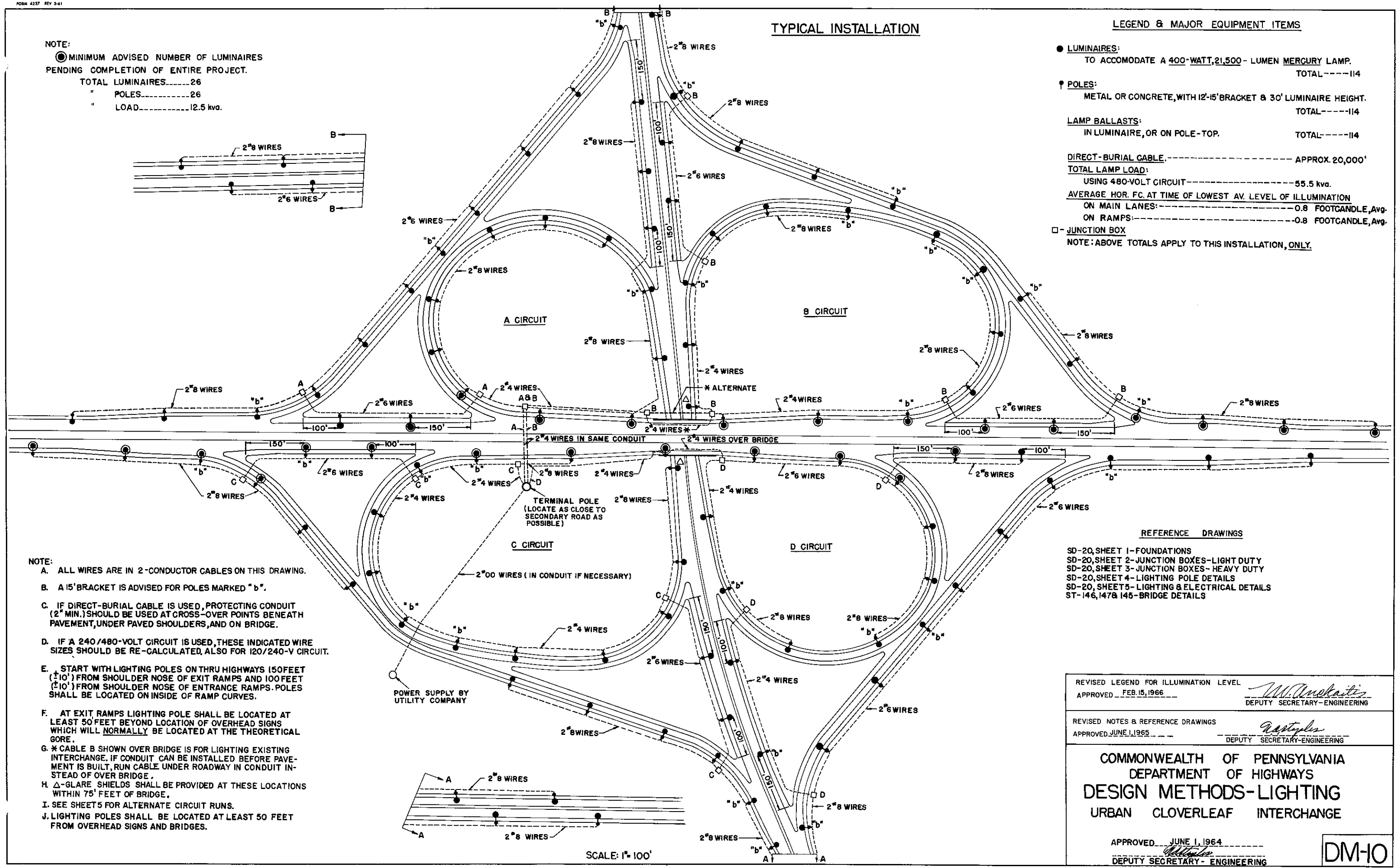
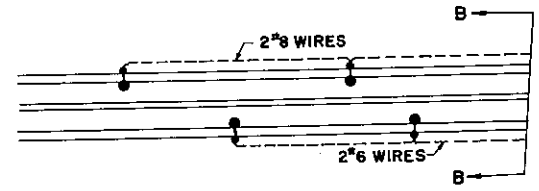
**DM-6**

TYPICAL INSTALLATION

LEGEND & MAJOR EQUIPMENT ITEMS

NOTE:  
 ● MINIMUM ADVISED NUMBER OF LUMINAIRES  
 PENDING COMPLETION OF ENTIRE PROJECT.  
 TOTAL LUMINAIRES.....26  
 " POLES.....26  
 " LOAD.....12.5 kva.

● LUMINAIRES: TO ACCOMMODATE A 400-WATT, 21,500 - LUMEN MERCURY LAMP.	TOTAL-----114
POLES: METAL OR CONCRETE, WITH 12'-15' BRACKET & 30' LUMINAIRE HEIGHT.	TOTAL-----114
LAMP BALLASTS: IN LUMINAIRE, OR ON POLE-TOP.	TOTAL-----114
DIRECT-BURIAL CABLE.....	APPROX. 20,000'
TOTAL LAMP LOAD: USING 480-VOLT CIRCUIT.....	55.5 kva.
AVERAGE HOR. FC. AT TIME OF LOWEST AV. LEVEL OF ILLUMINATION ON MAIN LANES:.....	0.8 FOOTCANDLE, Avg.
ON RAMP:.....	0.8 FOOTCANDLE, Avg.
□ JUNCTION BOX	
NOTE: ABOVE TOTALS APPLY TO THIS INSTALLATION, ONLY.	



- NOTE:
- A. ALL WIRES ARE IN 2-CONDUCTOR CABLES ON THIS DRAWING.
  - B. A 15' BRACKET IS ADVISED FOR POLES MARKED "b".
  - C. IF DIRECT-BURIAL CABLE IS USED, PROTECTING CONDUIT (2" MIN.) SHOULD BE USED AT CROSS-OVER POINTS BENEATH PAVEMENT, UNDER PAVED SHOULDERS, AND ON BRIDGE.
  - D. IF A 240/480-VOLT CIRCUIT IS USED, THESE INDICATED WIRE SIZES SHOULD BE RE-CALCULATED, ALSO FOR 120/240-V CIRCUIT.
  - E. START WITH LIGHTING POLES ON THRU HIGHWAYS (50 FEET (±10') FROM SHOULDER NOSE OF EXIT RAMP AND 100 FEET (±10') FROM SHOULDER NOSE OF ENTRANCE RAMP). POLES SHALL BE LOCATED ON INSIDE OF RAMP CURVES.
  - F. AT EXIT RAMP LIGHTING POLE SHALL BE LOCATED AT LEAST 50 FEET BEYOND LOCATION OF OVERHEAD SIGNS WHICH WILL NORMALLY BE LOCATED AT THE THEORETICAL GORE.
  - G. \* CABLE B SHOWN OVER BRIDGE IS FOR LIGHTING EXISTING INTERCHANGE. IF CONDUIT CAN BE INSTALLED BEFORE PAVEMENT IS BUILT, RUN CABLE UNDER ROADWAY IN CONDUIT INSTEAD OF OVER BRIDGE.
  - H. Δ-GLARE SHIELDS SHALL BE PROVIDED AT THESE LOCATIONS WITHIN 75' FEET OF BRIDGE.
  - I. SEE SHEET 5 FOR ALTERNATE CIRCUIT RUNS.
  - J. LIGHTING POLES SHALL BE LOCATED AT LEAST 50 FEET FROM OVERHEAD SIGNS AND BRIDGES.

REFERENCE DRAWINGS

- SD-20, SHEET 1-FOUNDATIONS
- SD-20, SHEET 2-JUNCTION BOXES-LIGHT DUTY
- SD-20, SHEET 3-JUNCTION BOXES-HEAVY DUTY
- SD-20, SHEET 4-LIGHTING POLE DETAILS
- SD-20, SHEET 5-LIGHTING & ELECTRICAL DETAILS
- ST-146, 147 & 145-BRIDGE DETAILS

REVISED LEGEND FOR ILLUMINATION LEVEL  
 APPROVED FEB. 15, 1966  
*M. Anhalt*  
 DEPUTY SECRETARY-ENGINEERING

REVISED NOTES & REFERENCE DRAWINGS  
 APPROVED JUNE 1, 1965  
*R. Styples*  
 DEPUTY SECRETARY-ENGINEERING

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 DESIGN METHODS-LIGHTING  
 URBAN CLOVERLEAF INTERCHANGE

APPROVED JUNE 1, 1964  
*[Signature]*  
 DEPUTY SECRETARY-ENGINEERING

DM-10



### TYPICAL INSTALLATION

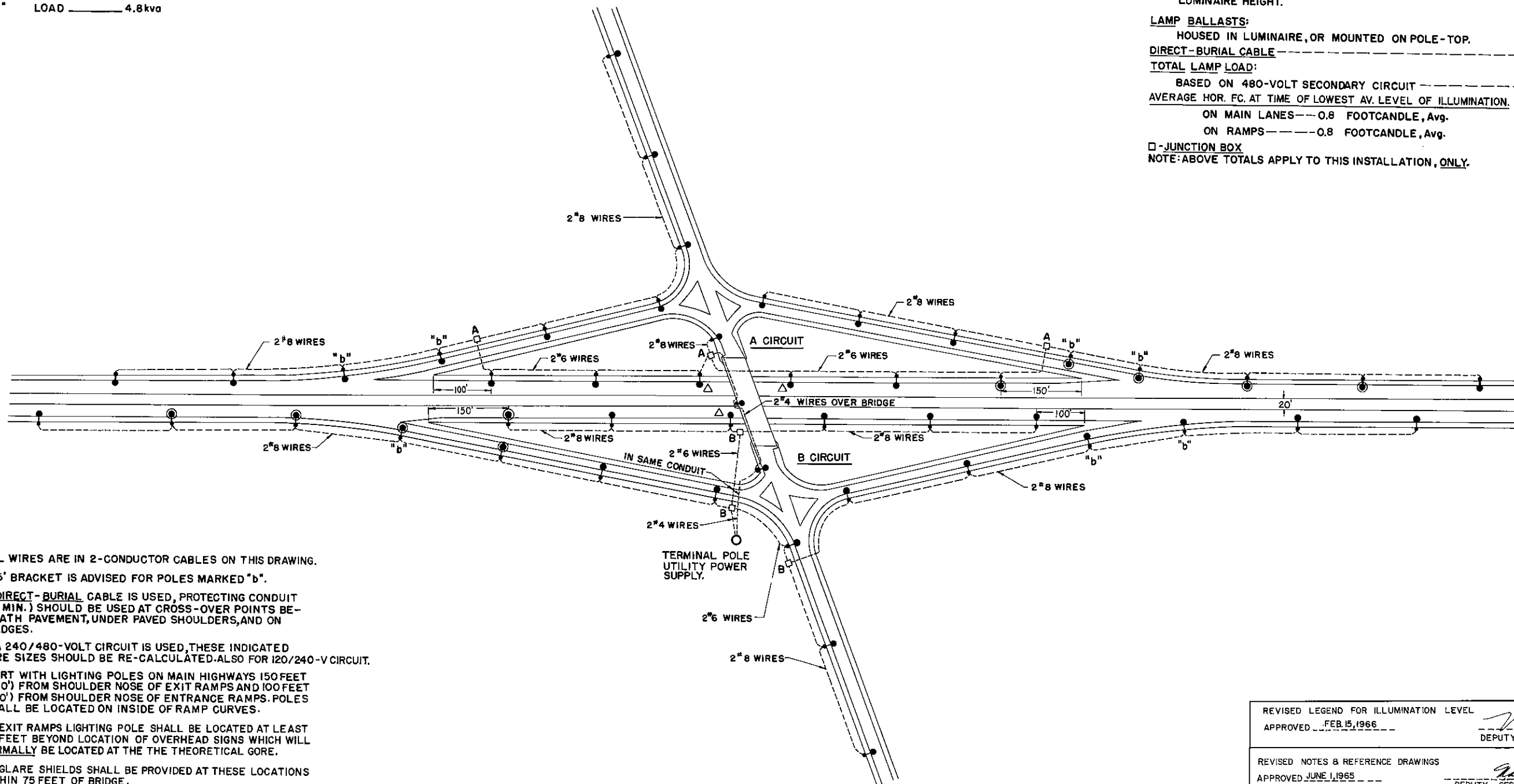
**NOTE:**

● MINIMUM ADVISED NUMBER OF LUMINAIRES  
PENDING COMPLETION OF ENTIRE PROJECT.

- TOTAL LUMINAIRES — 10
- POLES — 10
- LOAD — 4.8 kva

### LEGEND & MAJOR EQUIPMENT ITEMS

- **LUMINAIRES:**  
TO ACCOMMODATE 400-WATT, 21,500-LUMEN MERCURY LAMP. TOTAL---48
- † **POLES:**  
METAL OR CONCRETE POLE WITH 12' BRACKET AND APPROX. 30' LUMINAIRE HEIGHT. TOTAL--48
- LAMP BALLASTS:**  
HOUSED IN LUMINAIRE, OR MOUNTED ON POLE-TOP. TOTAL--48
- DIRECT-BURIAL CABLE**-----APPROX. 9300'
- TOTAL LAMP LOAD:**  
BASED ON 480-VOLT SECONDARY CIRCUIT-----23.1 kva  
AVERAGE HOR. FC. AT TIME OF LOWEST AV. LEVEL OF ILLUMINATION.  
ON MAIN LANES---0.8 FOOTCANDLE, Avg.  
ON RAMPS-----0.8 FOOTCANDLE, Avg.
- **-JUNCTION BOX**
- NOTE: ABOVE TOTALS APPLY TO THIS INSTALLATION, ONLY.



**NOTE:**

- A. ALL WIRES ARE IN 2-CONDUCTOR CABLES ON THIS DRAWING.
- B. A 15' BRACKET IS ADVISED FOR POLES MARKED "b".
- C. IF DIRECT-BURIAL CABLE IS USED, PROTECTING CONDUIT (2" MIN.) SHOULD BE USED AT CROSS-OVER POINTS BE- NEATH PAVEMENT, UNDER PAVED SHOULDERS, AND ON BRIDGES.
- D. IF A 240/480-VOLT CIRCUIT IS USED, THESE INDICATED WIRE SIZES SHOULD BE RE-CALCULATED. ALSO FOR 120/240-V CIRCUIT.
- E. START WITH LIGHTING POLES ON MAIN HIGHWAYS 150 FEET (±10') FROM SHOULDER NOSE OF EXIT RAMPS AND 100 FEET (±10') FROM SHOULDER NOSE OF ENTRANCE RAMPS. POLES SHALL BE LOCATED ON INSIDE OF RAMP CURVES.
- F. AT EXIT RAMPS LIGHTING POLE SHALL BE LOCATED AT LEAST 50 FEET BEYOND LOCATION OF OVERHEAD SIGNS WHICH WILL NORMALLY BE LOCATED AT THE THEORETICAL GORE.
- G. Δ-GLARE SHIELDS SHALL BE PROVIDED AT THESE LOCATIONS WITHIN 75 FEET OF BRIDGE.
- I. SEE SHEET 5 FOR ALTERNATE CIRCUIT RUNS.
- J. LIGHTING POLES SHALL BE LOCATED AT LEAST 50 FEET FROM OVERHEAD SIGNS AND BRIDGES.

**REFERENCE DRAWINGS**

- SD-20, SHEET 1- FOUNDATIONS
- SD-20, SHEET 2- JUNCTION BOXES- LIGHT DUTY
- SD-20, SHEET 3- JUNCTION BOXES- HEAVY DUTY
- SD-20, SHEET 4- LIGHTING POLE DETAILS
- SD-20, SHEET 5- LIGHTING & ELECTRICAL DETAILS
- ST-146, 147, & 145 BRIDGE DETAILS

SCALE: 1" = 100'

REVISED LEGEND FOR ILLUMINATION LEVEL  
APPROVED FEB. 15, 1966  
*W. A. ...*  
DEPUTY SECRETARY-ENGINEERING

REVISED NOTES & REFERENCE DRAWINGS  
APPROVED JUNE 1, 1965  
*W. A. ...*  
DEPUTY SECRETARY-ENGINEERING

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
DESIGN METHODS-LIGHTING  
URBAN DIAMOND INTERCHANGE

APPROVED JUNE 1, 1964  
*W. A. ...*  
DEPUTY SECRETARY-ENGINEERING

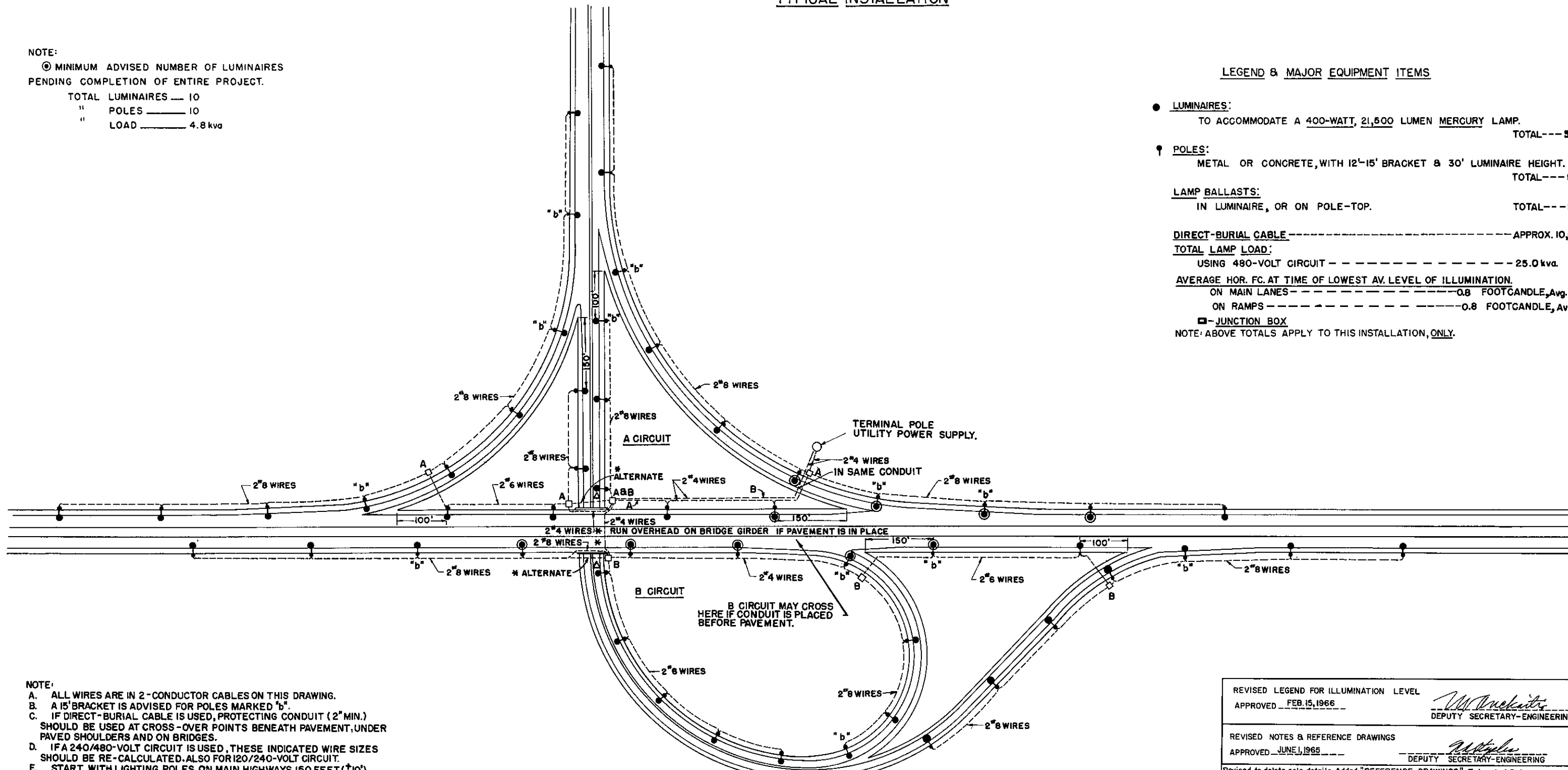
DM-11

### TYPICAL INSTALLATION

NOTE:  
 © MINIMUM ADVISED NUMBER OF LUMINAIRES  
 PENDING COMPLETION OF ENTIRE PROJECT.  
 TOTAL LUMINAIRES — 10  
 " POLES — 10  
 " LOAD — 4.8 kva

#### LEGEND & MAJOR EQUIPMENT ITEMS

- LUMINAIRES:  
 TO ACCOMMODATE A 400-WATT, 21,500 LUMEN MERCURY LAMP. TOTAL --- 52
- † POLES:  
 METAL OR CONCRETE, WITH 12'-15' BRACKET & 30' LUMINAIRE HEIGHT. TOTAL --- 52
- LAMP BALLASTS:  
 IN LUMINAIRE, OR ON POLE-TOP. TOTAL --- 52
- DIRECT-BURIAL CABLE ----- APPROX. 10,000'
- TOTAL LAMP LOAD:  
 USING 480-VOLT CIRCUIT ----- 25.0 kva.
- AVERAGE HOR. FC. AT TIME OF LOWEST AV. LEVEL OF ILLUMINATION.  
 ON MAIN LANES ----- 0.8 FOOTCANDLE, Avg.  
 ON RAMP --- 0.8 FOOTCANDLE, Avg.
- JUNCTION BOX
- NOTE: ABOVE TOTALS APPLY TO THIS INSTALLATION, ONLY.

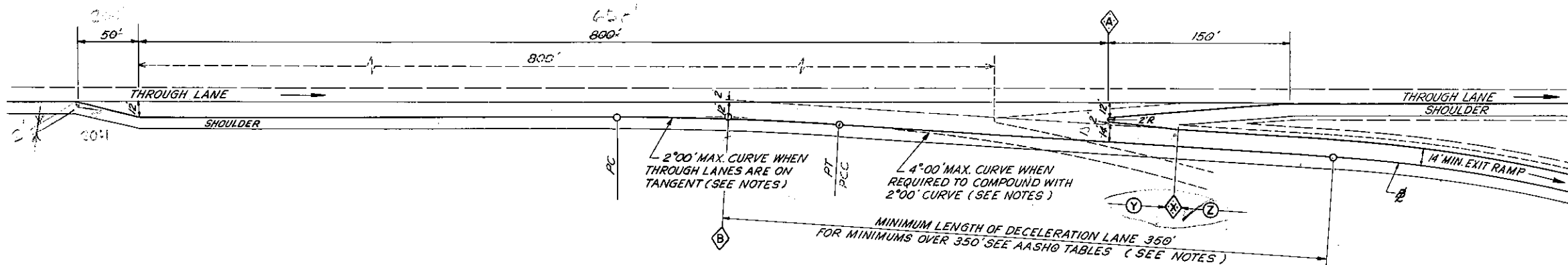


NOTE:  
 A. ALL WIRES ARE IN 2-CONDUCTOR CABLES ON THIS DRAWING.  
 B. A 15' BRACKET IS ADVISED FOR POLES MARKED "b".  
 C. IF DIRECT-BURIAL CABLE IS USED, PROTECTING CONDUIT (2" MIN.) SHOULD BE USED AT CROSS-OVER POINTS BENEATH PAVEMENT, UNDER PAVED SHOULDERS AND ON BRIDGES.  
 D. IF A 240/480-VOLT CIRCUIT IS USED, THESE INDICATED WIRE SIZES SHOULD BE RE-CALCULATED. ALSO FOR 120/240-VOLT CIRCUIT.  
 E. START WITH LIGHTING POLES ON MAIN HIGHWAYS 150 FEET (±10') FROM SHOULDER NOSE OF EXIT RAMP AND A 100 FEET (±10') FROM SHOULDER NOSE OF ENTRANCE RAMP. POLES SHALL BE LOCATED ON INSIDE OF RAMP CURVES.  
 F. \*CABLES SHOWN OVER BRIDGE ARE FOR LIGHTING EXISTING INTERCHANGE. IF CONDUITS CAN BE INSTALLED BEFORE PAVEMENT IS BUILT, RUN CABLES UNDER ROADWAY IN CONDUIT INSTEAD OF OVER BRIDGE.  
 G. AT EXIT RAMP LIGHTING POLE SHALL BE LOCATED AT LEAST 50 FEET BEYOND LOCATION OF OVERHEAD SIGNS WHICH WILL NORMALLY BE LOCATED AT THE THEORETICAL GORE.  
 H. Δ - GLARE SHIELDS SHALL BE PROVIDED AT THESE LOCATIONS WITHIN 75 FEET OF BRIDGE.  
 I. SEE SHEET 5 FOR ALTERNATE CIRCUIT RUNS.  
 J. LIGHTING POLES SHALL BE LOCATED AT LEAST 50 FEET FROM OVERHEAD SIGNS AND BRIDGES.

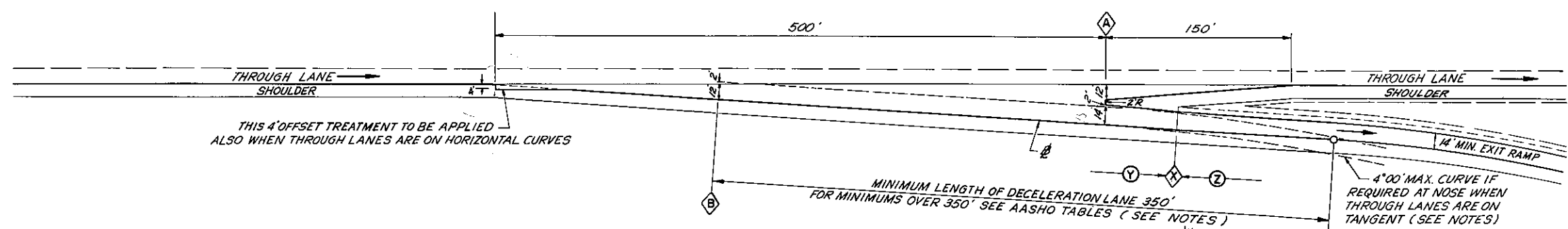
REFERENCE DRAWINGS  
 SD-20, SHEET 1-FOUNDATIONS  
 SD-20, SHEET 2-JUNCTION BOXES-LIGHT DUTY  
 SD-20, SHEET 3-JUNCTION BOXES-HEAVY DUTY  
 SD-20, SHEET 4-LIGHTING POLE DETAILS  
 SD-20, SHEET 5-LIGHTING & ELECTRICAL DETAILS  
 ST-146, 147, 145-BRIDGE DETAILS

SCALE: 1"=100'

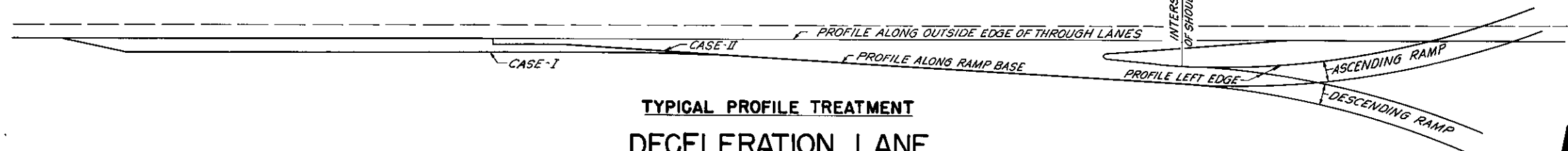
REVISED LEGEND FOR ILLUMINATION LEVEL APPROVED FEB. 15, 1966	<i>W. M. ...</i> DEPUTY SECRETARY-ENGINEERING
REVISED NOTES & REFERENCE DRAWINGS APPROVED JUNE 1, 1965	<i>M. ...</i> DEPUTY SECRETARY-ENGINEERING
Revised to delete pole details. Added "REFERENCE DRAWINGS", Relocated Poles. APPROVED JUNE 1, 1964	<i>M. ...</i> DEPUTY SECRETARY-ENGINEERING
Revised for footcandle levels on main lanes and ramps. APPROVED JUNE 10, 1960	<i>F. ...</i> DEPUTY SECRETARY-ENGINEERING
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF HIGHWAYS <b>DESIGN METHODS-LIGHTING</b> URBAN TRUMPET INTERCHANGE	
APPROVED March 15, 1960 <i>F. ...</i> DEPUTY SECRETARY-ENGINEERING	DM-12



**EXIT TERMINAL TREATMENT - CASE I**



**EXIT TERMINAL TREATMENT - CASE II**



**TYPICAL PROFILE TREATMENT  
DECELERATION LANE**

**DESIGN PROCEDURE**

FOR DESIRABLE DESIGN LENGTH OF SPEED-CHANGE LANES, SEE AASHO-GEOMETRIC HIGHWAY DESIGN-RURAL, TABLES VII-10 & VII-11, PAGES 288 & 289 OR AASHO-ARTERIAL HIGHWAYS-URBAN, TABLES D-9 & D-10, PAGES 169 & 170.

THE LENGTH GIVEN IN THE TABLES INCLUDES THE EFFECTIVE TAPER.

THE EFFECTIVE TAPER LENGTH FOR THESE TREATMENTS IS CONSIDERED TO BE INCLUDED IN THAT PORTION BETWEEN THE NOSE AT A TO A POINT WHERE THE TAPER IS TWELVE (12) FEET WIDE AT B.

THE LENGTH OF DECELERATION OR ACCELERATION LANE IS MEASURED TO THE FIRST SPEED CHANGE CURVE, WHEN REQUIRED, AT C.

CASE-I, THROUGH ROADWAY TOTAL EXCEEDS 15,000 A.D.T.  
CASE-II, THROUGH ROADWAY TOTAL UNDER 15,000 A.D.T.

THE ALIGNMENT OF SPEED-CHANGE LANES DEVELOPED IN CONJUNCTION WITH CURVED PORTION OF HIGHWAY WILL BE DESIGNED IN ACCORDANCE WITH AASHO-GEOMETRIC DESIGN POLICY PAGE 276, FIG. XII-14B & C, PAGE 488.

THE BASE LINE OF ALL RAMPS SHALL BE APPLIED THROUGH THE SPEED CHANGE LANES AND SINGLE LANE RAMPS ON THE RIGHT EDGE OF PAVEMENT IN THE DIRECTION OF TRAFFIC AND ON PARALLEL RAMPS IN THE CENTER OF THE DIVISOR AS INDICATED BY THE DESIGN PROCEDURE OF INTERCHANGES FIG. X-7, PAGE 605, GEOMETRIC DESIGN OF RURAL HIGHWAYS, AASHO.

THE PROFILE GRADE WILL BE DEVELOPED ON THE BASE LINE AND IT WILL REFLECT THE ATTAINMENT OF SUPERELEVATION, AND WILL REFLECT THE PROCEDURE AS SHOWN BY THE PENNSYLVANIA DEPARTMENT OF HIGHWAYS STANDARD C-97. A PROFILE OF THE OPPOSITE EDGE MAY ALSO BE DRAWN. THIS PROFILE WILL BE DEVELOPED IN ACCORDANCE WITH "PROFILE DESIGN PROCEDURE" DESCRIBED ON PAGE 398, AASHO-GEOMETRIC DESIGN OF RURAL HIGHWAYS.

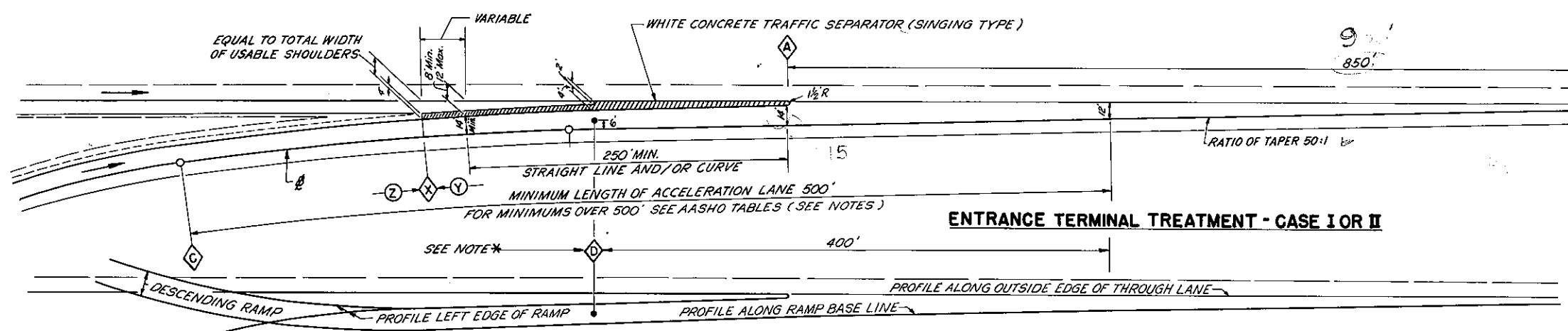
ON THE CONSTRUCTION DRAWINGS THE FINISHED ELEVATIONS FOR SPEED-CHANGE LANES AND BOTH EDGES OF RAMP PAVEMENT WILL BE SHOWN AT 25 FOOT INTERVAL EITHER BY PROFILE OR PLAN VIEW.

**LIMITS OF ROADWAY STRUCTURE**

- ⊠ LOCATION OF PAVEMENT STRUCTURE CHANGE.
- Ⓚ PAVEMENT AND SHOULDER STRUCTURE SAME AS THROUGH ROADWAY.
- Ⓛ PAVEMENT STRUCTURE SIMILAR TO CONNECTING ROAD, SHOULDER STRUCTURE SIMILAR TO THROUGH ROADWAY.

**NOTE:-**

- \* PROVIDE FOR MIN. 600' VISIBILITY FROM A POINT DESIGNATED ON RAMP TO A POINT BACK ON THROUGH LANE WHEN ESTABLISHING HORIZONTAL AND VERTICAL ALIGNMENT. (VEHICLE HEIGHT OF 4.5' - HEIGHT OF EYE 3.75')



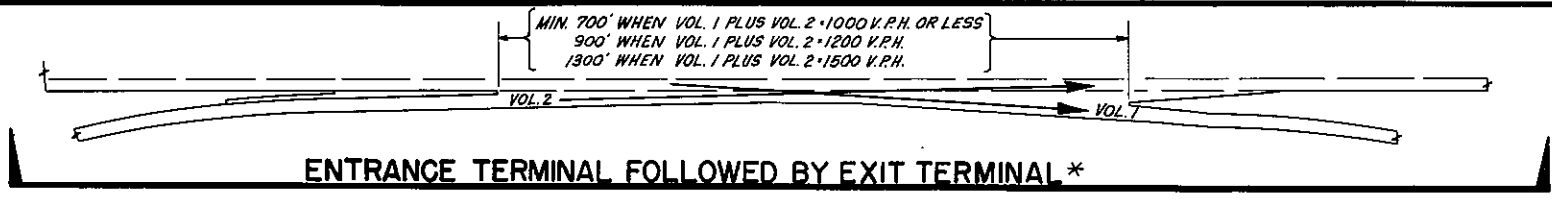
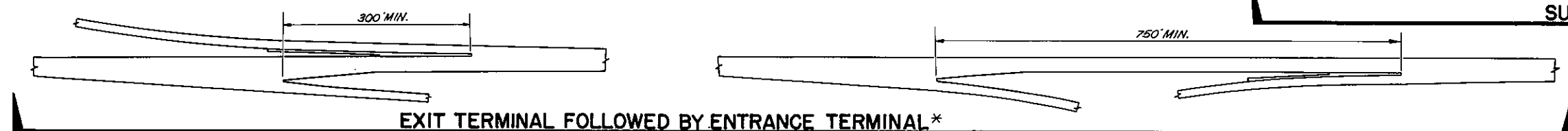
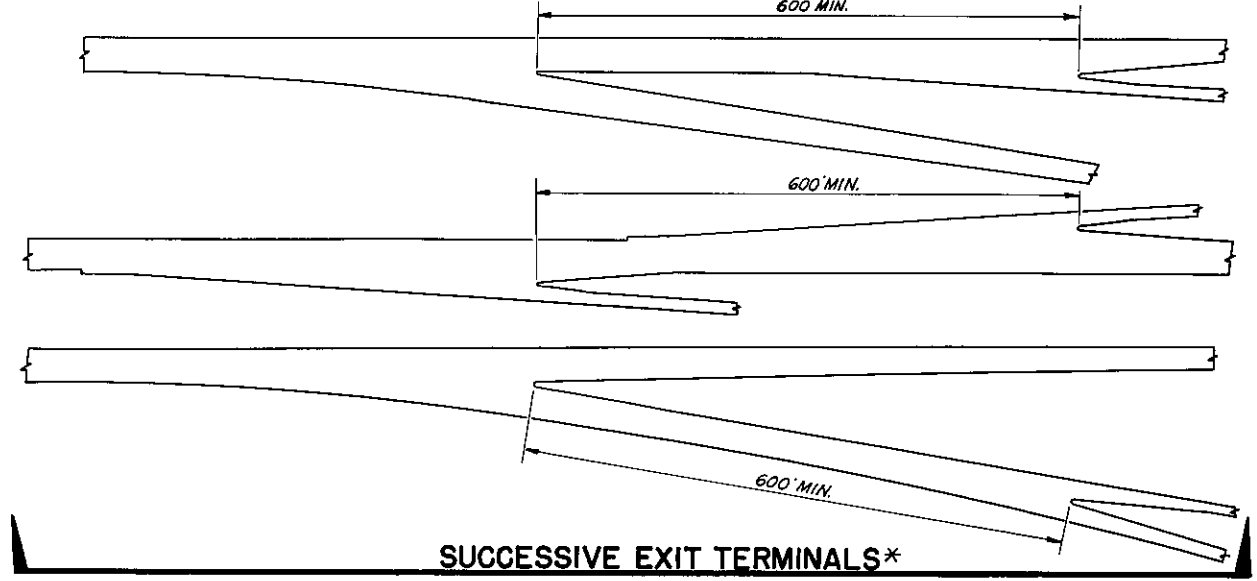
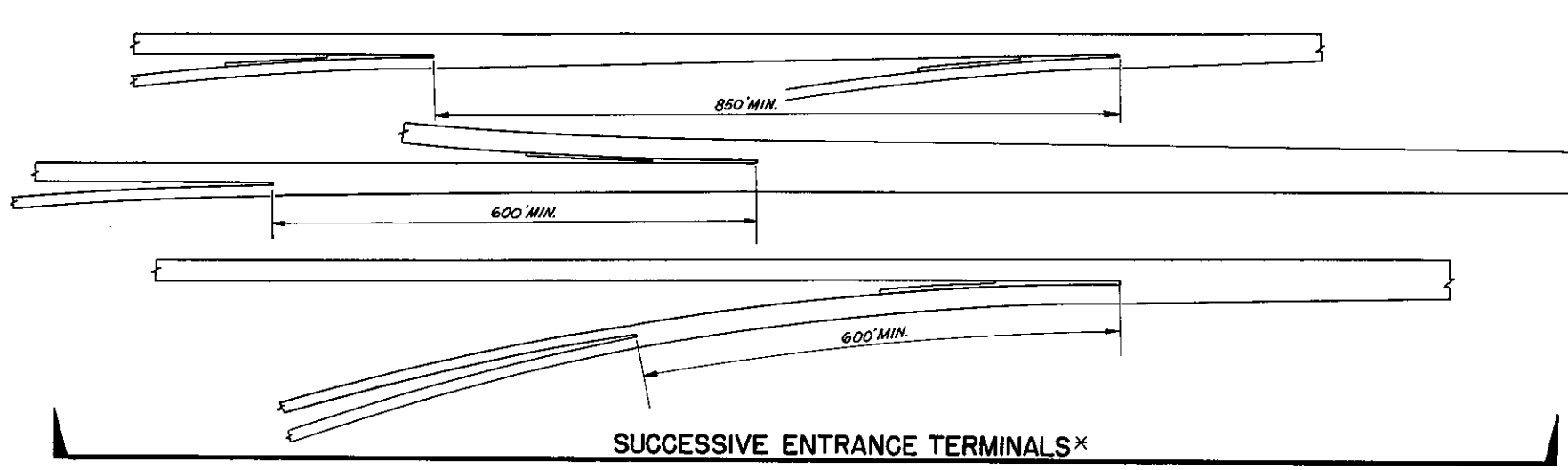
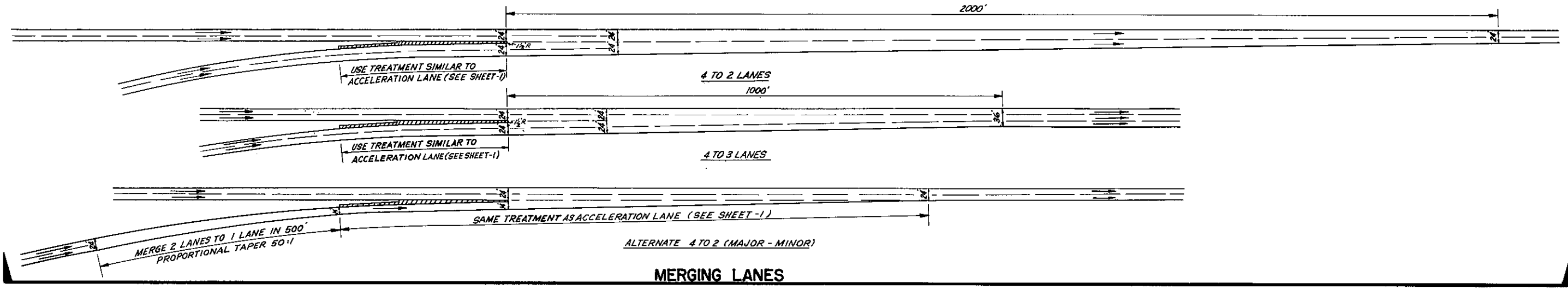
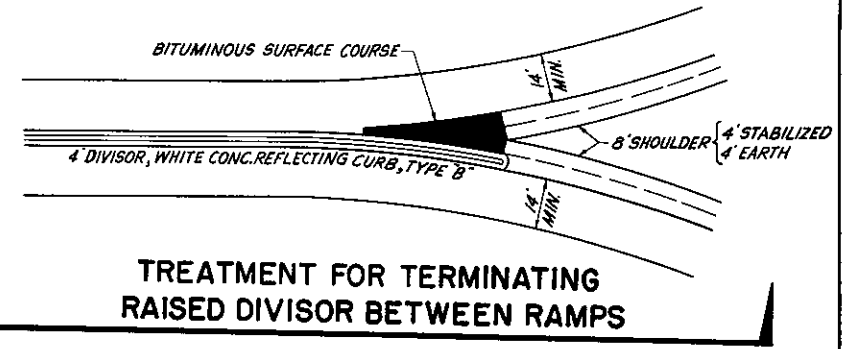
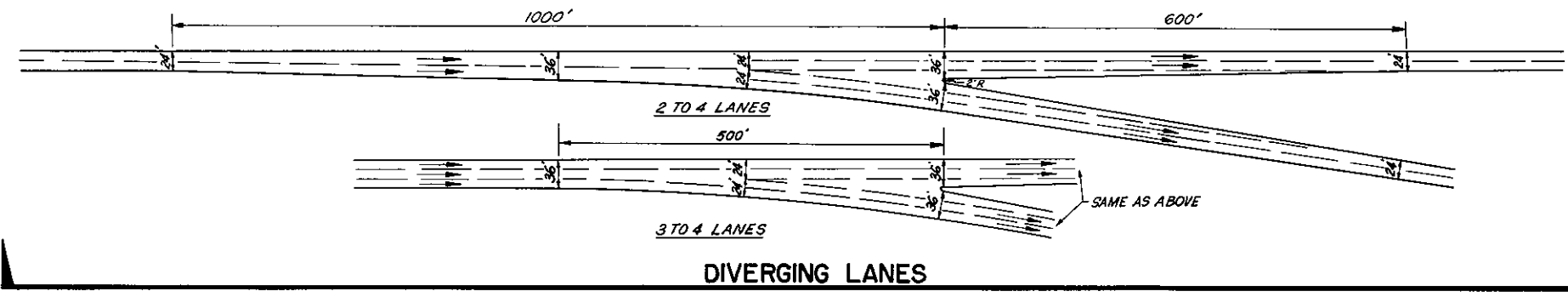
**ENTRANCE TERMINAL TREATMENT - CASE I OR II**

**TYPICAL PROFILE TREATMENT  
ACCELERATION LANE**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
— DESIGN METHODS —  
SPEED CHANGE LANES  
DECELERATION AND ACCELERATION LANES

APPROVED April 3rd 1962  
C. D. ... ASST. CHIEF ENGINEER

SHEET 1 OF 2  
**DM-15**



NOTE:-  
 \*PROVIDE FOR MINIMUM BUT NOT LESS THAN LENGTH REQUIRED FOR MANEUVERING OR SPEED CHANGE. TERMINAL ARRANGEMENTS SHOWN ARE APPLICABLE SYMMETRICALLY.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS

**— DESIGN METHODS —**  
**SPEED CHANGE LANES**

TREATMENT FOR TERMINATING DIVISOR BETWEEN RAMPS  
 MERGING AND DIVERGING LANES  
 SUCCESSIVE PAMP TERMINALS

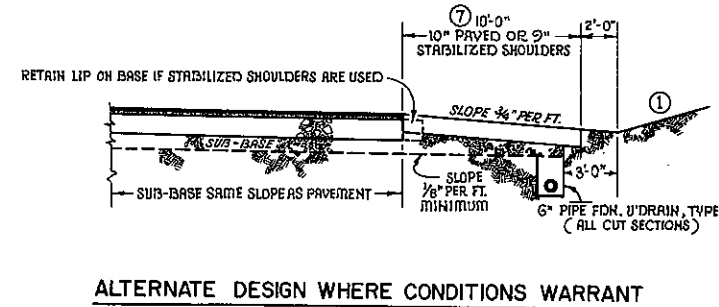
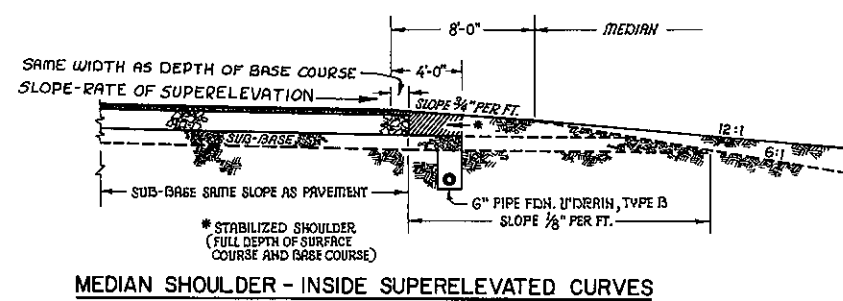
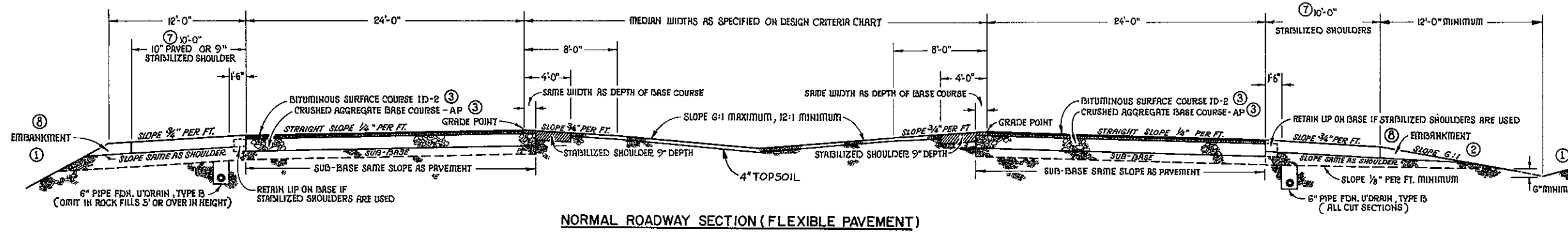
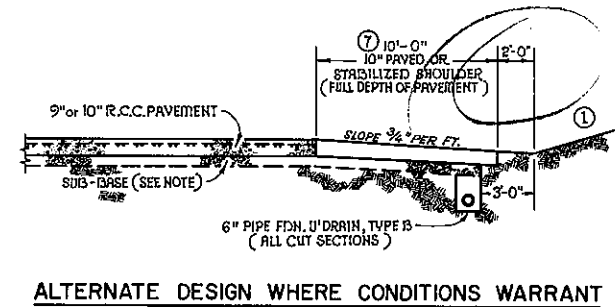
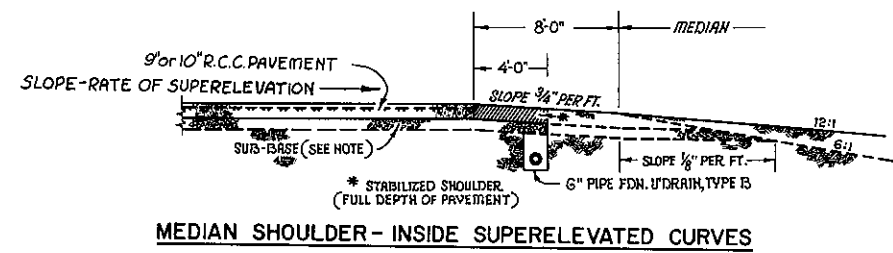
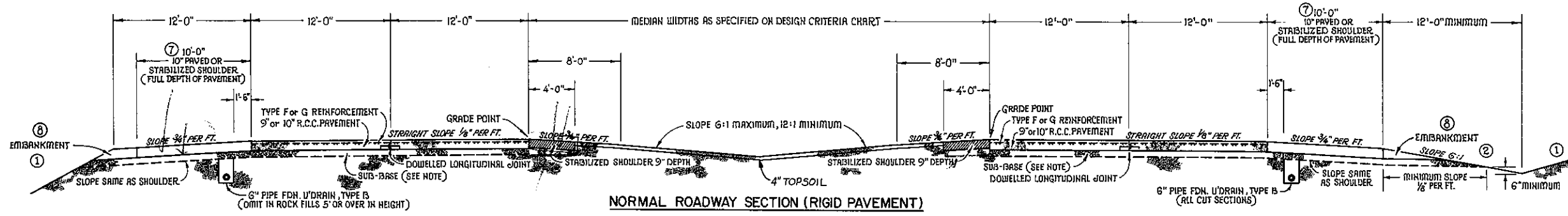
SHEET 2 OF 2

**DM-15**



# GENERAL NOTES

- ① EXCAVATION AND EMBANKMENT SLOPES:-  
6:1 - UNDER 4' EARTH & CLAY  
4:1 - 4' TO 10' EARTH & CLAY  
2:1 - OVER 10' EARTH & CLAY  
½:1 - OR VARIABLE ROCK & HARD SHALE EXCAVATION
  - ② SWALE - MINIMUM WIDTH AS SHOWN - WIDTH TO VARY IN ORDER TO PROVIDE 6" TO 8" DIFFERENCE IN ELEVATION BETWEEN SUB-BASE OUTLET AND BOTTOM OF SWALE.
  - ③ DEPTH OF SURFACE AND BASE COURSES TO BE DETERMINED ON FORM 4225 SUBMISSION, BASED ON SOILS REPORT.
  - ④ ON THE INSIDE OF HORIZONTAL CURVES PROVIDE FOR THE HORIZONTAL CLEARANCE TO INSURE ADEQUATE SIGHT DISTANCE FOR THE ADOPTED DESIGN SPEED.  
(SEE AASHO GEOMETRIC DESIGN)
  - ⑤ FOR DESIGN WIDTH OF PAVEMENT FOR RAMP SEE TABLE VII - 7, PAGE 273 AASHO GEOMETRIC DESIGN - RURAL, OR TABLE J-8, PAGE 479 AASHO GEOMETRIC DESIGN - URBAN. PROVIDE FOR WIDTHS TO THE EVEN FOOT AND MINIMUM WIDTH OF 14 FEET.
  - ⑥ WHERE WARRANTED PROVIDE FOR VERTICAL CURBS ALONG INSIDE EDGE OF HORIZONTAL CURVES OF LESS THAN 150 FOOT RADIUS IN PLACE OF STABILIZED OR PAVED SHOULDER. RAMP ONLY.
  - ⑦ PAVED SHOULDER ON INTERSTATE AND WHERE APPROVED BY THE CHIEF ENGINEER.
  - ⑧ EMBANKMENT AREA SHOULD BE STABILIZED WHEN STABILIZED SHOULDERS ARE USED.
- GENERAL NOTES CONTINUED ON SHEET #5.



## CONSTANT WIDTH MEDIAN WITH LEVEL ROADWAYS

Revised: Sub-Base note; shoulders; include Median U-Turn and Maintenance Cross Over; and Sheet 5 of 5.  
Approved: \_\_\_\_\_ 1965  
Assistant Chief Engineer - Design

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

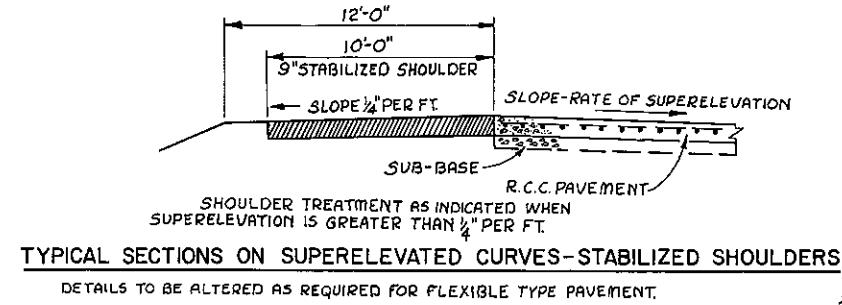
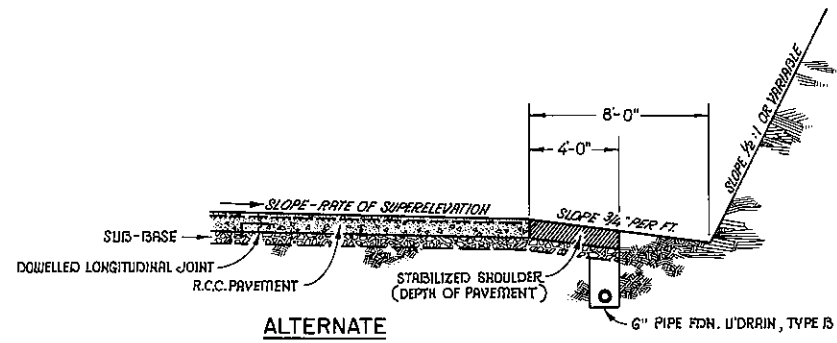
ROADWAY SECTIONS  
INTERSTATE AND CLASS I

APPROVED: MAY 10, 1965

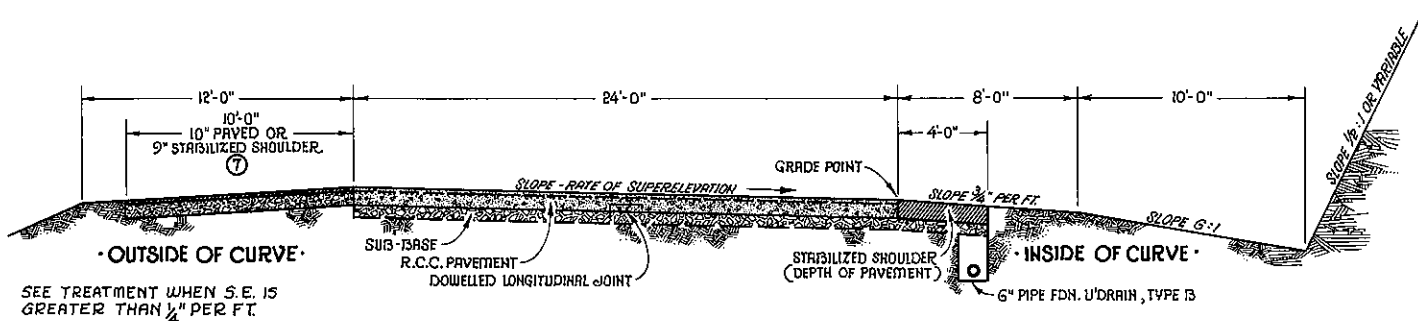
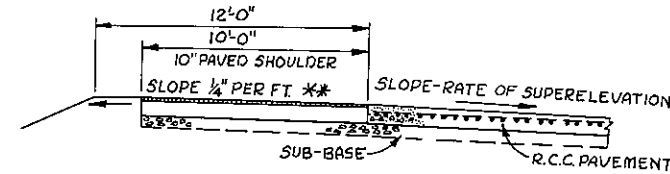
ASSISTANT CHIEF ENGINEER - DESIGN

SHEET 1 OF 5

DM-17

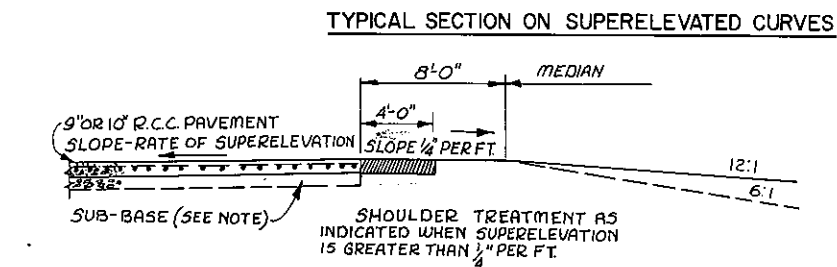


\*\* SLOPE SHOULDER 1/4" PER FT AWAY FROM PAVEMENT WHEN SUPERELEVATION IS GREATER THAN 1/4" PER FT. AND UP TO 5/8" PER FT. INCLUSIVE. NO SUB-BASE UNDER THE SHOULDER IS REQUIRED WHEN SUPERELEVATION IS GREATER THAN 5/8" PER FT. SLOPE SHOULDER 1/4" PER FT. TOWARDS THE PAVEMENT AND INCLUDE SUB-BASE MATERIAL AS INDICATED.



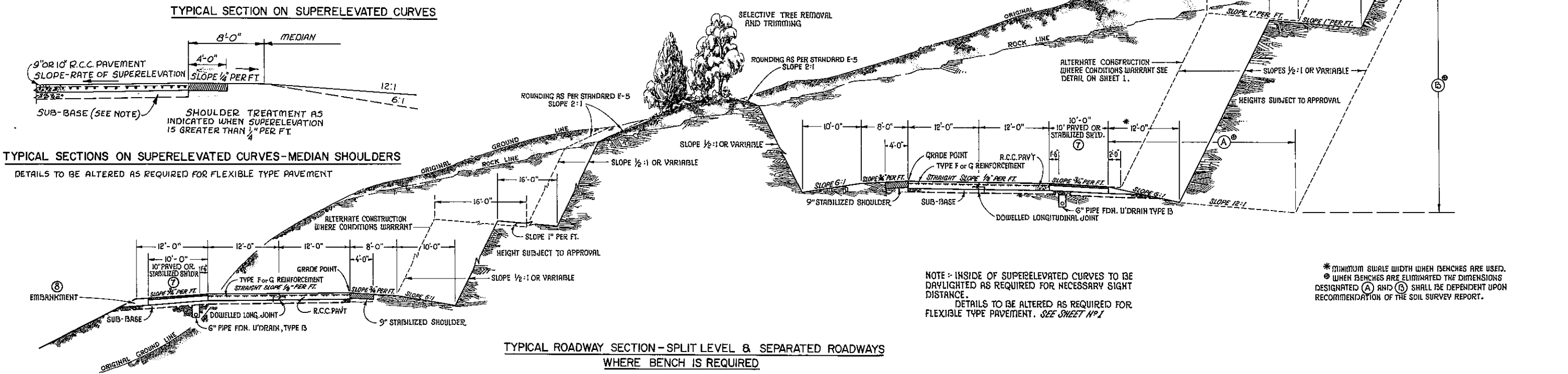
**TYPICAL SECTIONS ON SUPERELEVATED CURVES-PAVED SHOULDERS**

DETAILS TO BE ALTERED AS REQUIRED FOR FLEXIBLE TYPE PAVEMENT.



**TYPICAL SECTIONS ON SUPERELEVATED CURVES-MEDIAN SHOULDERS**

DETAILS TO BE ALTERED AS REQUIRED FOR FLEXIBLE TYPE PAVEMENT



NOTE - INSIDE OF SUPERELEVATED CURVES TO BE DAYLIGHTED AS REQUIRED FOR NECESSARY SIGHT DISTANCE. DETAILS TO BE ALTERED AS REQUIRED FOR FLEXIBLE TYPE PAVEMENT. SEE SHEET NO 1

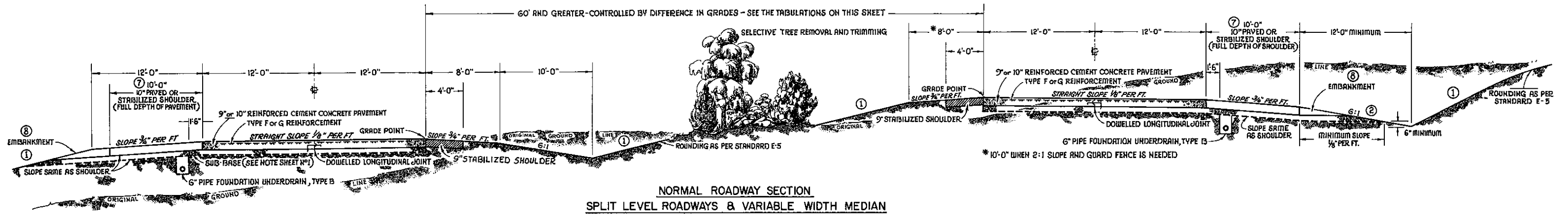
\* MINIMUM SWALE WIDTH WHEN BENCHES ARE USED.  
 @ WHEN BENCHES ARE ELIMINATED THE DIMENSIONS DESIGNATED (A) AND (B) SHALL BE DEPENDENT UPON RECOMMENDATION OF THE SOIL SURVEY REPORT.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 ROADWAY SECTIONS  
 INTERSTATE AND CLASS I

⊗ SEE NOTES ON SHEET NO 1

SHEET 2 OF 5

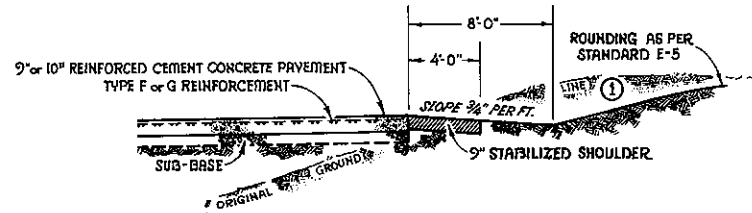
DM-17



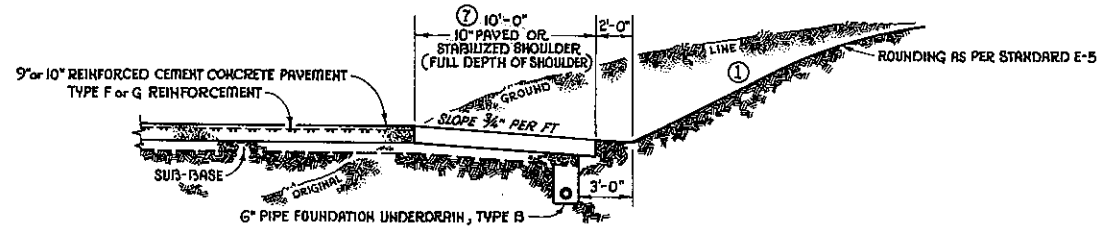
**NORMAL ROADWAY SECTION  
SPLIT LEVEL ROADWAYS & VARIABLE WIDTH MEDIAN**

DIFFERENCE IN FINISHED GRADES	MINIMUM DISTANCE BETWEEN PAVEMENT EDGE USING 2:1 SLOPE
10'	75'
20'	100'
30'	120'
40'	140'
50'	160'
100'	280'

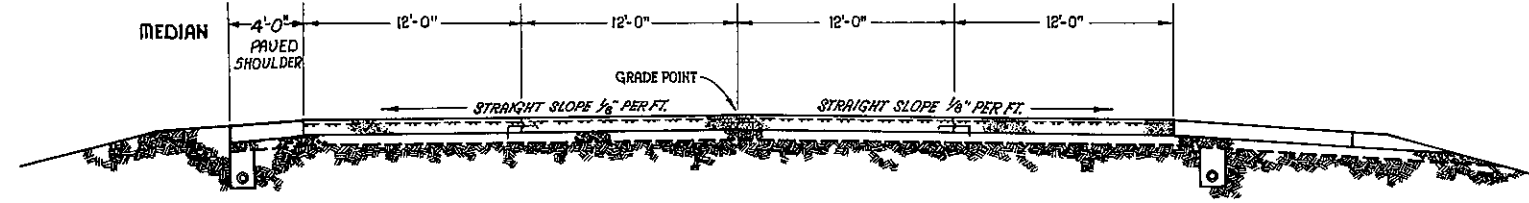
NOTE: THESE LIMITS SHALL BE ADJUSTED AS REQUIRED WHERE DIFFERENT SLOPES ARE USED.



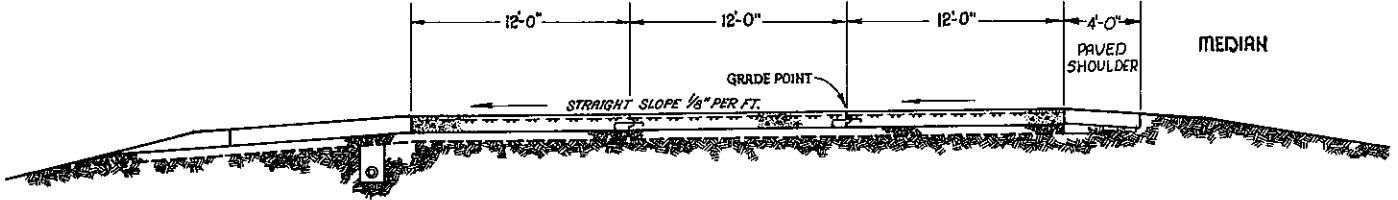
**ALTERNATE DESIGN WHERE CONDITIONS WARRANT**



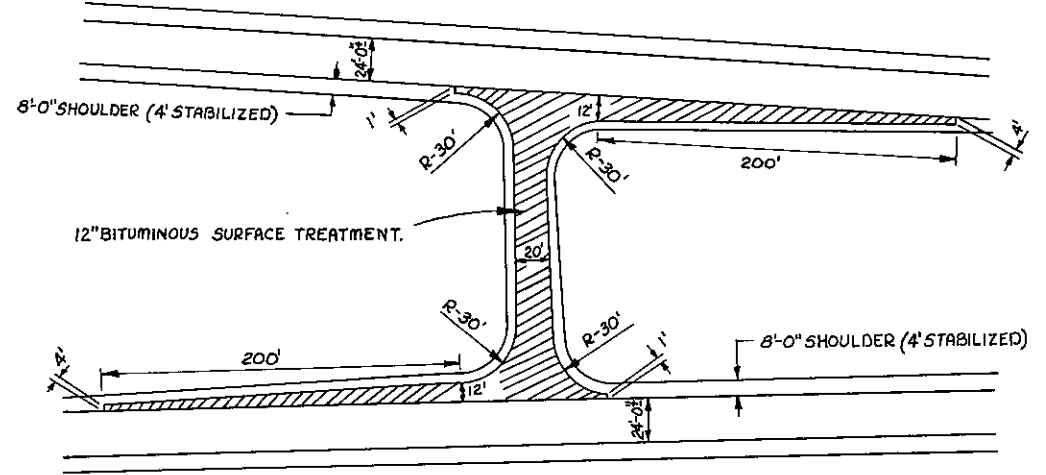
**ALTERNATE DESIGN WHERE CONDITIONS WARRANT**



**FOUR LANES DIRECTIONAL**



**THREE LANES DIRECTIONAL**



**MEDIAN U-TURN AND MAINTENANCE CROSSOVER**

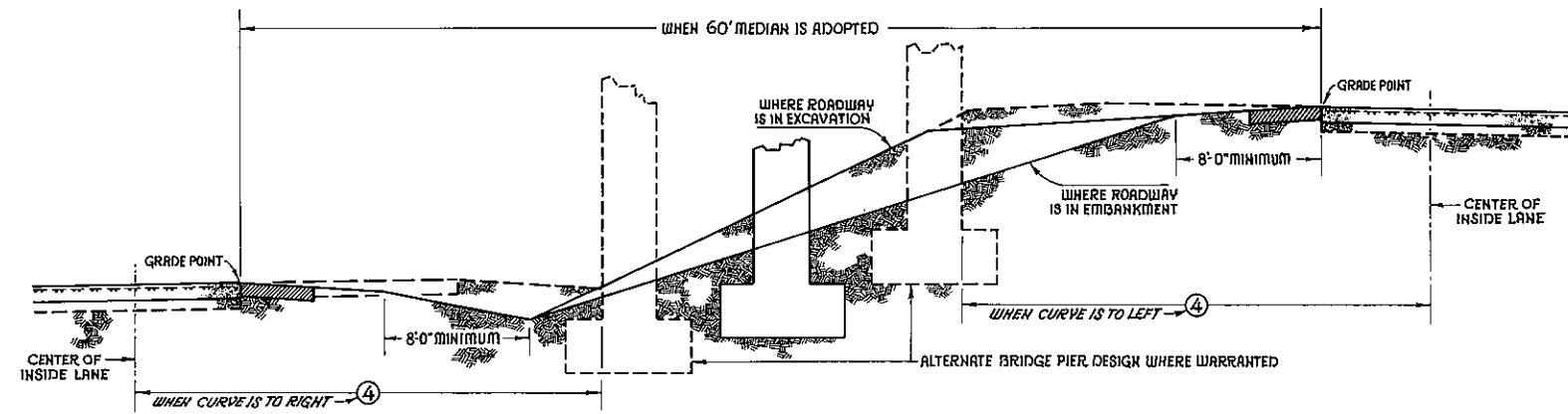
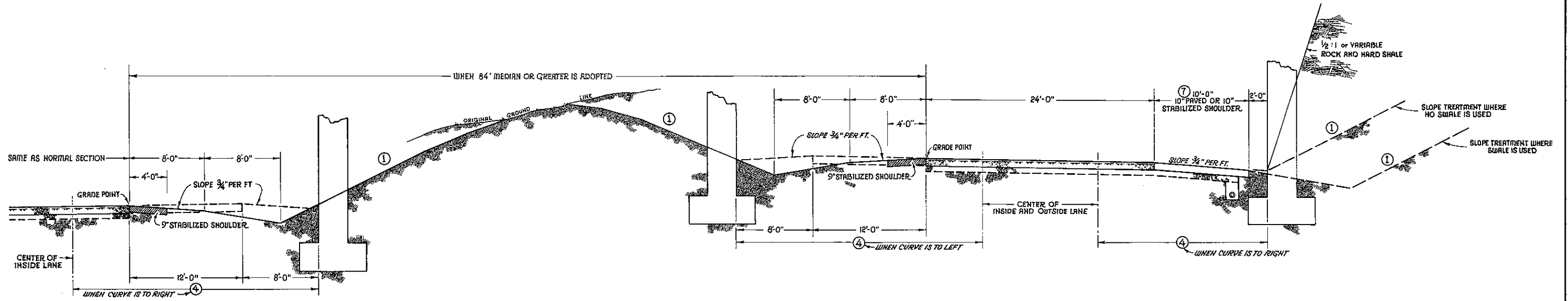
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

**ROADWAY SECTIONS  
INTERSTATE AND CLASS I**

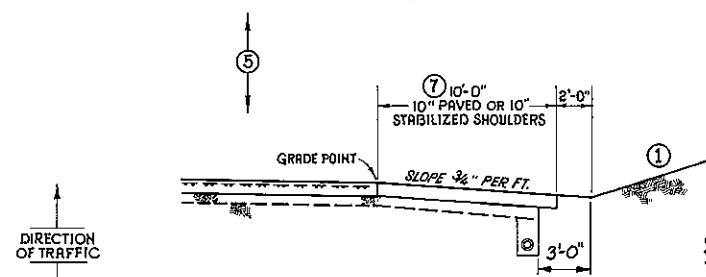
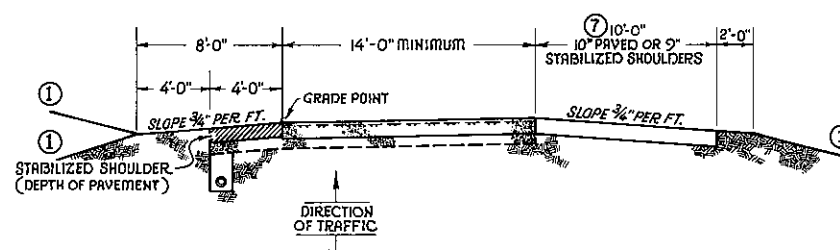
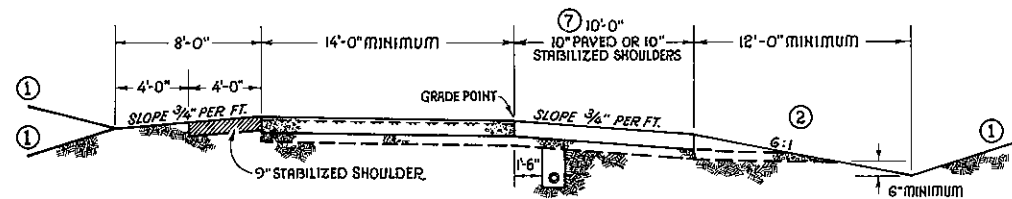
SHEET 3 OF 5  
**DM-17**

SEE NOTES ON SHEET NO 1





**ROADWAY SECTION AT STRUCTURE**



**SINGLE LANE RAMP**

NOTE: PAVEMENT STRUCTURE SIMILAR TO MAIN LINE  
 FOR SHOULDER TREATMENT ON HIGH SIDE OF SUPERELEVATION REFER TO SHEET 2 OF 5.

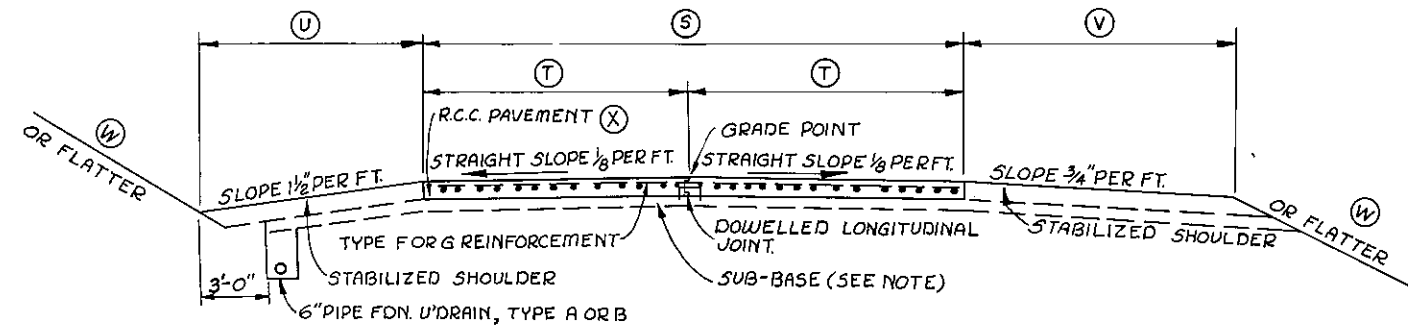
⊗ SEE NOTES ON SHEET NO 1

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 ROADWAY SECTIONS  
 INTERSTATE AND CLASS I

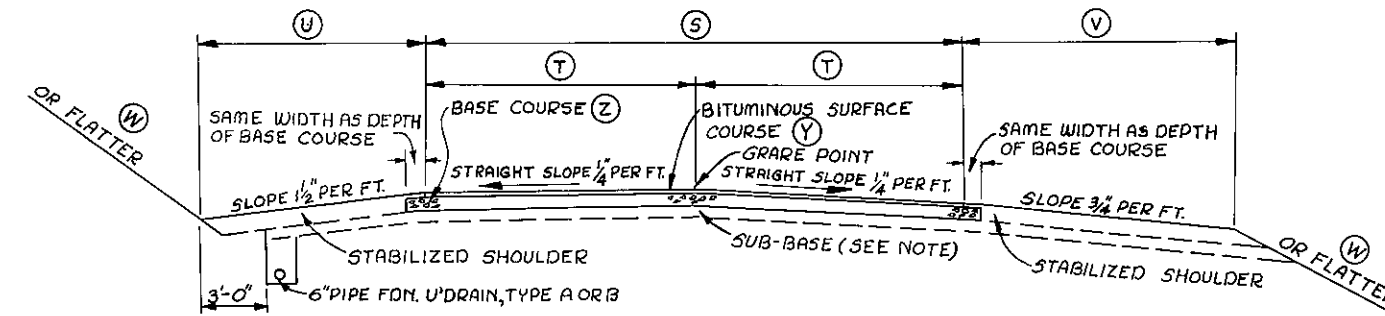
SHEET 4 OF 5

DM-17

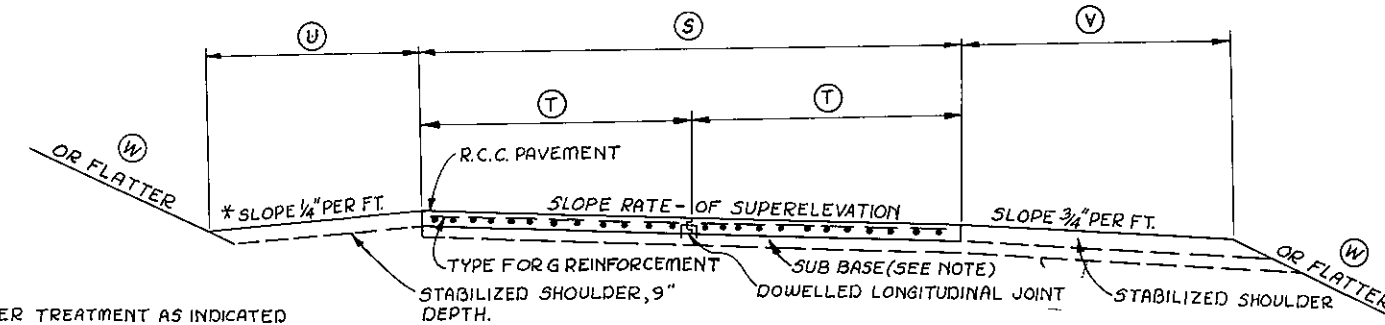
TRACED BY \_\_\_\_\_  
 FINAL BY \_\_\_\_\_



**NORMAL ROADWAY SECTION (RIGID PAVEMENT)**



**NORMAL ROADWAY SECTION (FLEXIBLE PAVEMENT)**



\* SHOULDER TREATMENT AS INDICATED WHEN SUPERELEVATION IS GREATER THAN 1/4" PER FT.

**TYPICAL SECTION ON SUPERELEVATED CURVES**

DETAILS TO BE ALTERED AS REQUIRED FOR FLEXIBLE TYPE PAVEMENT

**GENERAL NOTES (CONTINUED)**

SUB-BASE: DEPTH OF SUB-BASE IS DEPENDENT UPON RESULTS OF SOIL INVESTIGATION AND SHALL BE DETERMINED BY THE GREATEST OF THE FOLLOWING DEPTHS.

- (A) MINIMUM DEPTH OF SUB-BASE TO BE 6 INCHES.
- (B) STRUCTURAL DEPTHS SHALL BE AS DETERMINED BY PAVEMENT DESIGN CALCULATIONS SHOWN ON FORM 4225 AND IN THE SOIL REPORT.
- (C) FROST PROTECTION SHALL BE FURNISHED BY PROVIDING THE FOLLOWING DEPTHS OF FROST RESISTANT MATERIAL (PAVEMENT, BASE AND SUB-BASE) IN THE PAVEMENT STRUCTURE:
  - (a) RIGID PAVEMENT: ONE-HALF THE FROST PENETRATION DEPTH AS CALCULATED IN THE PAVEMENT DESIGN COMPUTATIONS.
  - (b) FLEXIBLE PAVEMENT: TOTAL FROST PENETRATION DEPTH AS CALCULATED IN THE PAVEMENT DESIGN COMPUTATIONS.

NO	HIGHWAYS CLASS 2	CLASS 3	CLASS 4	CLASS 5
(S)	24'-0"	22'-0"	20'-0"	18'-0"
(T)	12'-0"	11'-0"	10'-0"	9'-0"
(U)	10'-0"	6'-0"	6'-0"	6'-0"
(V)	12'-0"	8'-0"	8'-0"	8'-0"
(W)	2:1	2:1	1 1/2:1	1 1/2:1
(X) (Y) (Z)	TO BE DETERMINED ON FORM 4225 SUBMISSION, BASED ON SOILS REPORT.			

STABILIZED SHOULDERS TO BE FULL DEPTH OF SURFACE COURSE AND BASE COURSE OVER SUB-BASE. MAXIMUM 9" DEPTH WHEN NO SUB-BASE IS PROVIDED.

INSIDE OF SUPERELEVATED CURVES TO BE DAY LIGHTED AS REQUIRED FOR NECESSARY SIGHT DISTANCE.

REFER TO STANDARD C-97 FOR SUPERELEVATION CONTROLS MINIMUM SPIRAL LENGTH AND WIDENING.

ROUNDING ON CUT SLOPES AS PER STANDARD DRAWING E-5.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

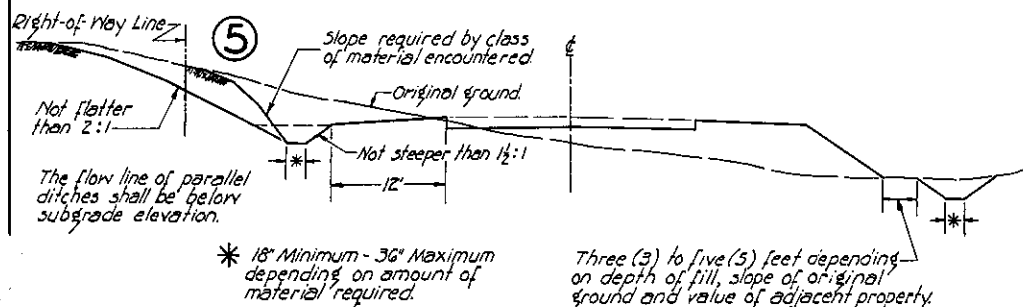
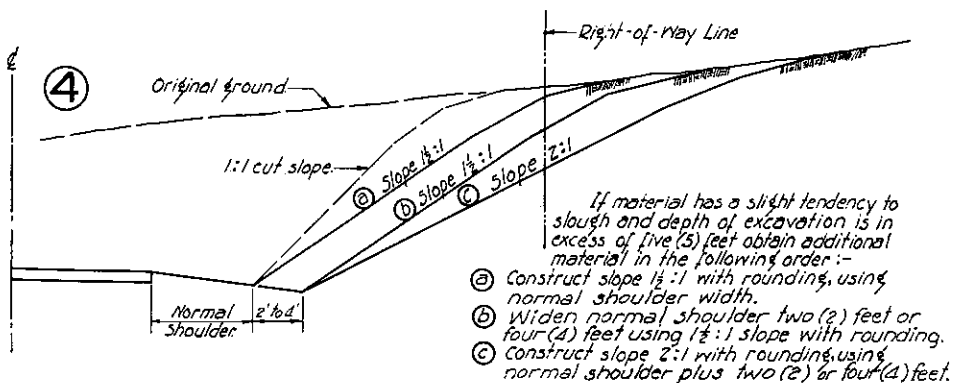
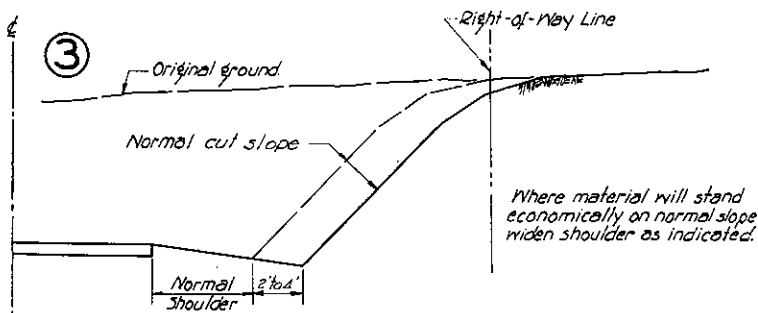
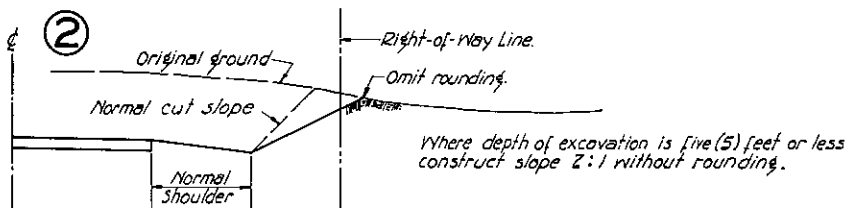
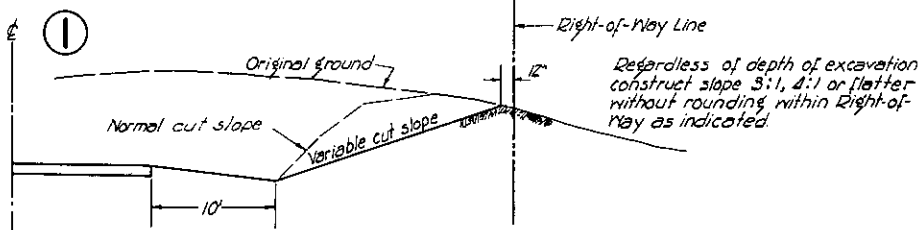
ROADWAY SECTIONS  
CLASS 2,3,4 & 5

SHEET 5 OF 5

DM-17

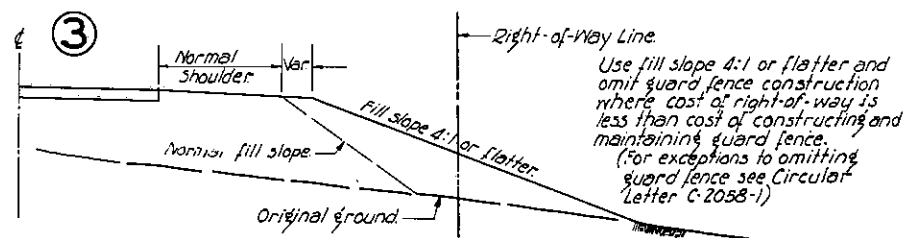
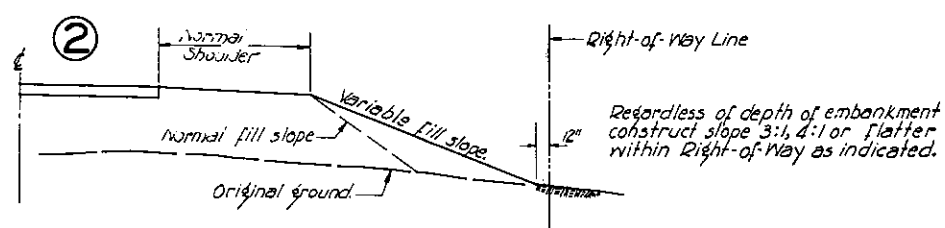
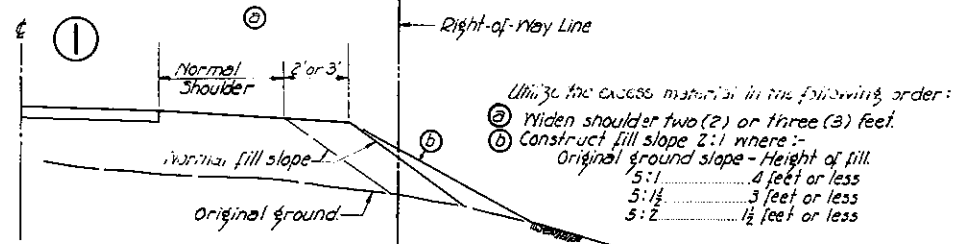
## METHODS FOR REDUCING OR ELIMINATING BORROW EXCAVATION

(Provided cost of additional Right of Way is nominal)

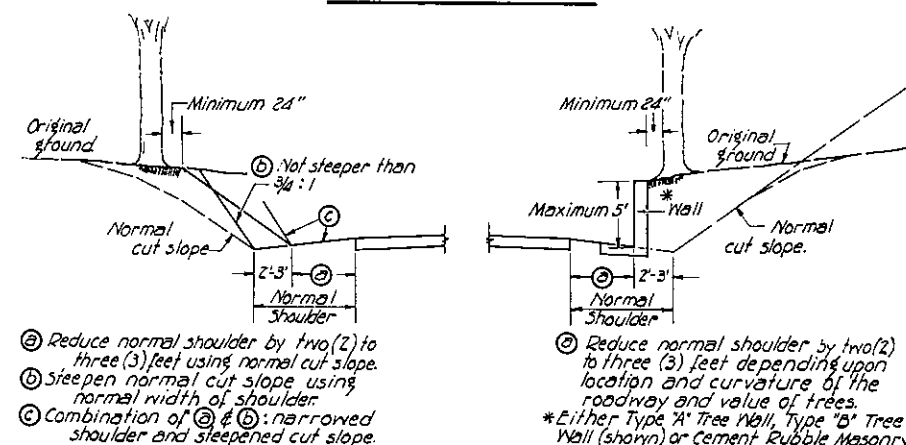


## METHODS FOR DISPOSAL OF EXCESS EXCAVATION

(Provided cost of additional Right of Way is nominal)



## METHODS FOR PROTECTING VALUABLE TREES



—Note—  
See Std. SD-1 or SD-2 for wall details and for Tree Protection in embankments.

Revised to delete fixed shoulder width and slope easement wording, also to increase tree clearance. Added NOTE.

Approved November 1, 1961

*[Signature]*  
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
—DESIGN METHODS—  
REDUCING OR ELIMINATING BORROW EXCAV,  
DISPOSAL OF EXCESS EXCAV. AND PROTECTING  
VALUABLE TREES - CIRCULAR LETTER C-2058-1

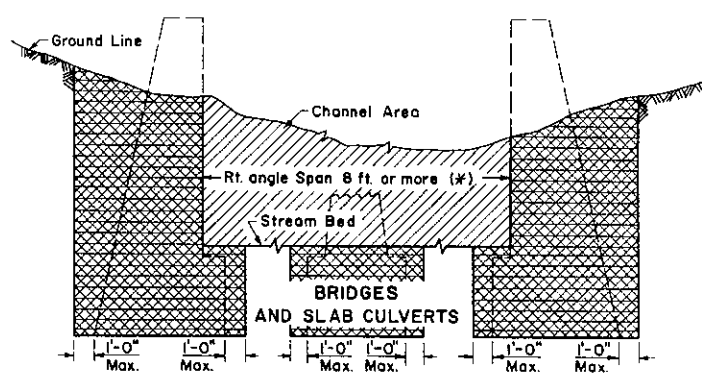
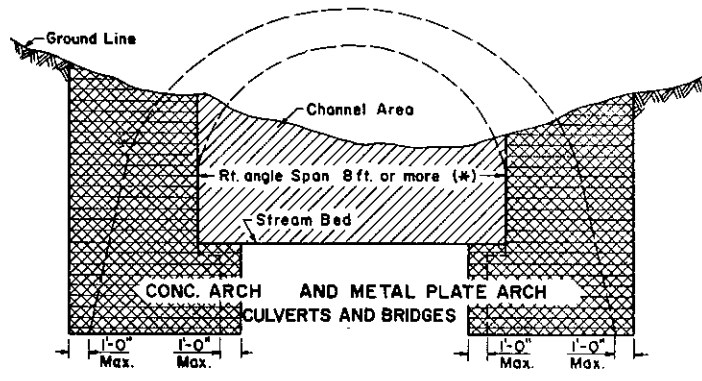
APPROVED November 23, 1943

*[Signature]*  
CHIEF ENGINEER

E-2

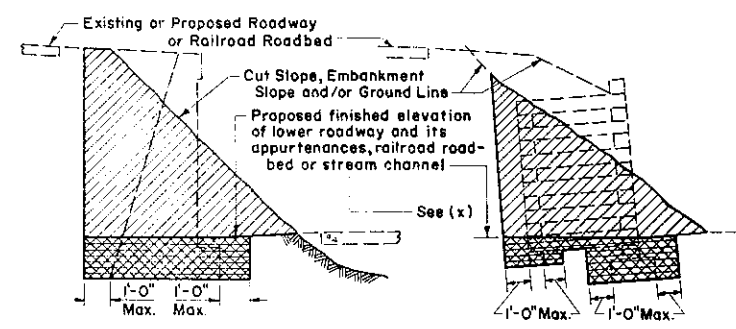
NOTE: Adjust Right-of-Way to conform with current practices.





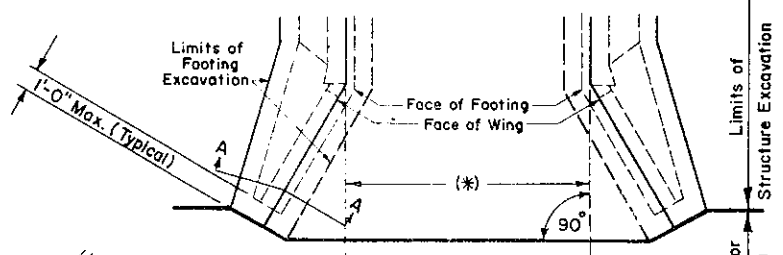
**BRIDGES, ARCH CULVERTS and SLAB CULVERTS over STREAM CHANNELS**

BRIDGES - Spans 20 Feet or more along  $\perp$  Roadway.  
 CULVERTS - Any Structure not classified as a Bridge.  
 \* When right angle span is less than 8' all excavation is Class 3.



(x) - Where no excavation is to be performed on the lower roadway, railroad roadbed, stream channel or adjacent area in front of the retaining wall or cribbing, all excavation is Class 3.

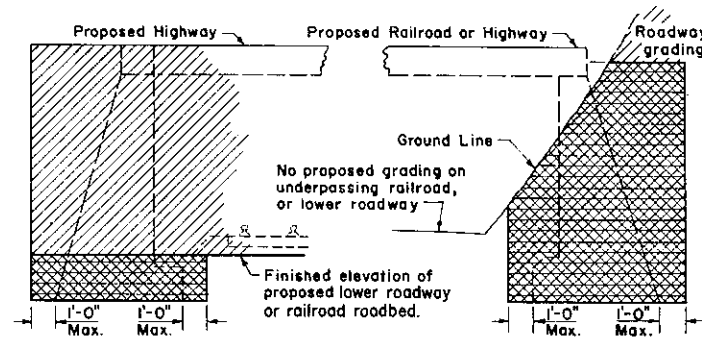
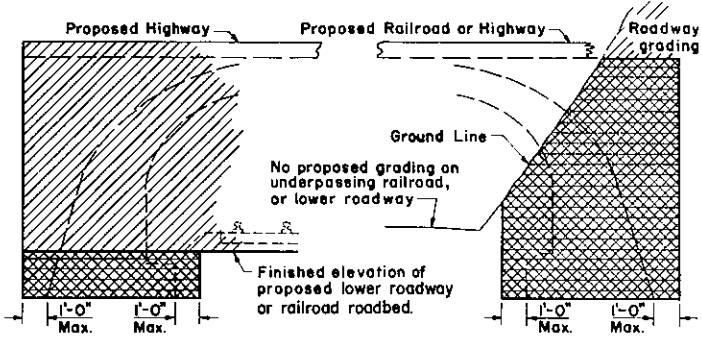
**RETAINING WALLS and CRIBBING**



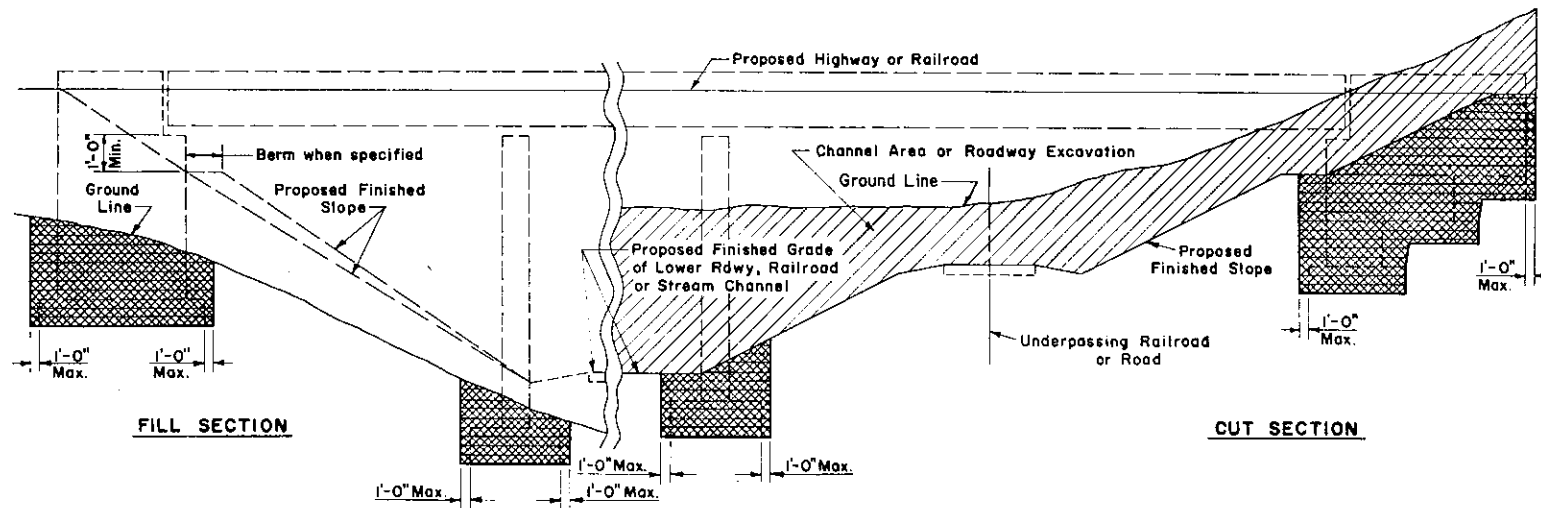
NOTE: Walls forming a part of bridge structures will be considered WING WALLS unless designated as RETAINING WALLS on the design drawings.

**BETWEEN ANGLED WING WALLS OF BRIDGES, ARCH & BOX CULVERTS or SIMILAR STRUCTURES**

(\*) - When the theoretical bottom width of the channel is less than 8 ft., all excavation is Class 3.

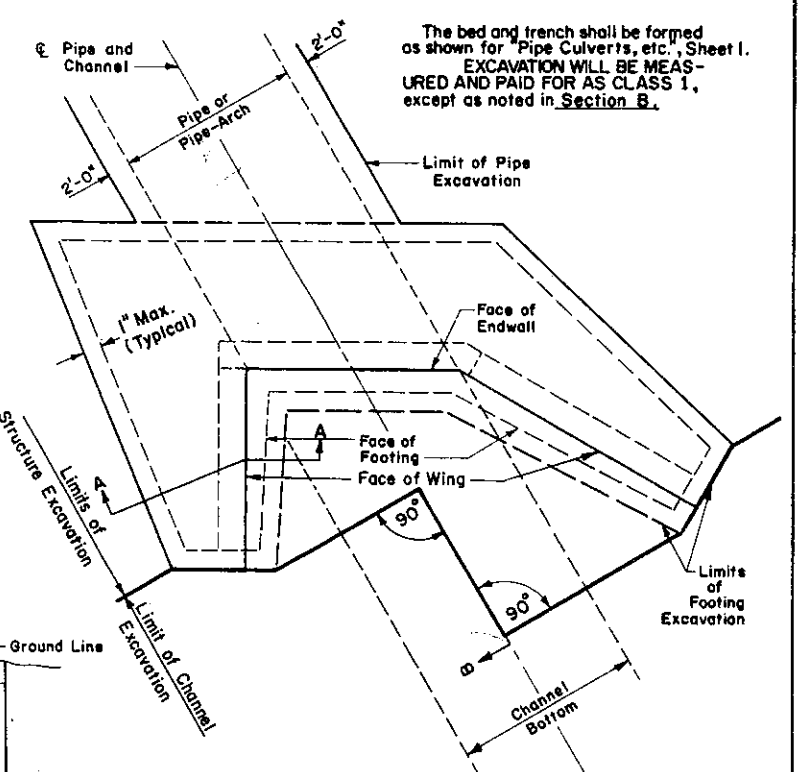


**GRADE SEPARATION STRUCTURES**

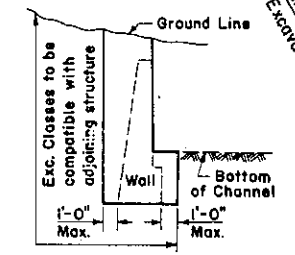


**MULTI-SPAN BRIDGES with STUB ABUTMENTS and WINGS**

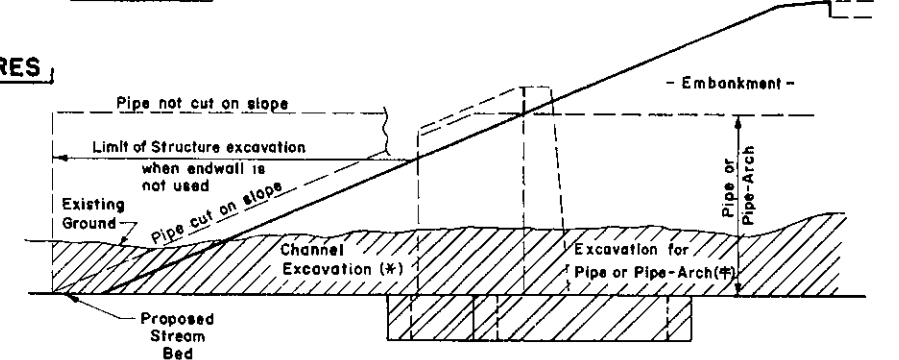
CLASS 1 EXCAV. CLASS 3 EXCAV. CLASS 4 EXCAV.



**METAL PLATE PIPE and METAL PLATE PIPE-ARCH CULVERTS with ENDWALL**

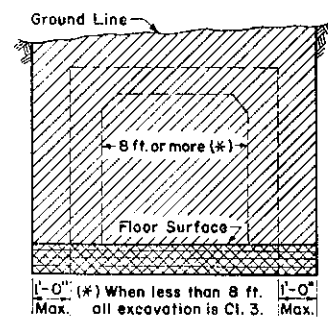


**SECTION A-A**

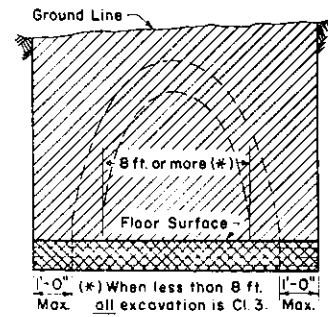


**SECTION B**

(\*) - Class 2 Excavation when channel bottom is less than 8 ft.  
 (†) Class 4 Excavation from 4 ft. above top of Pipe or Pipe-Arch, when span or diameter is less than 8 ft.

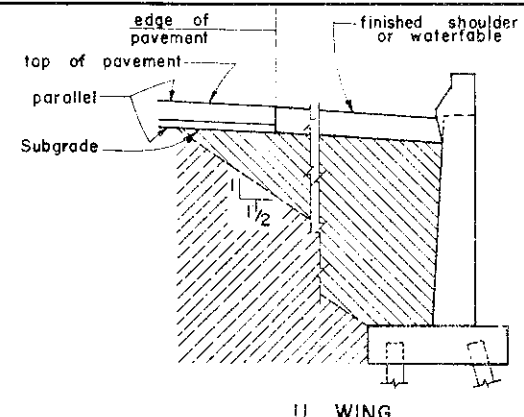
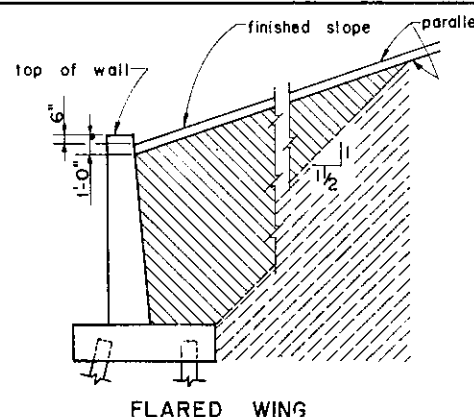
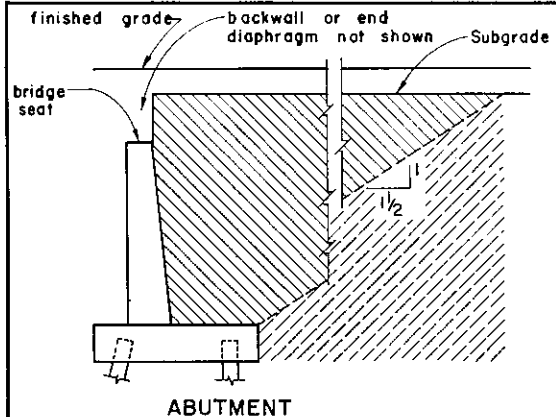


**R.C. BOX CULVERTS**

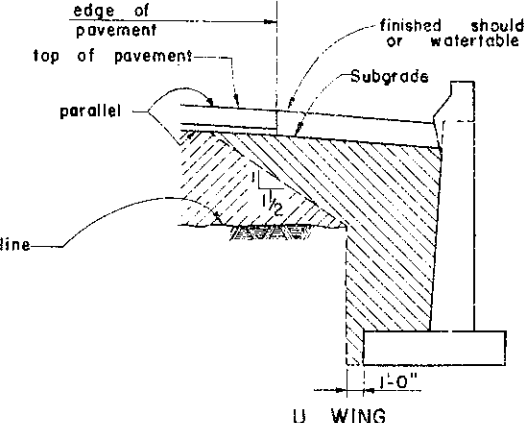
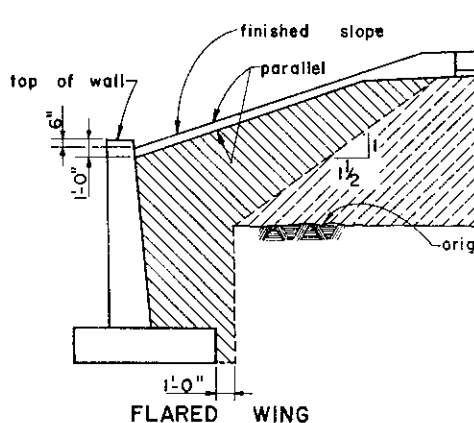
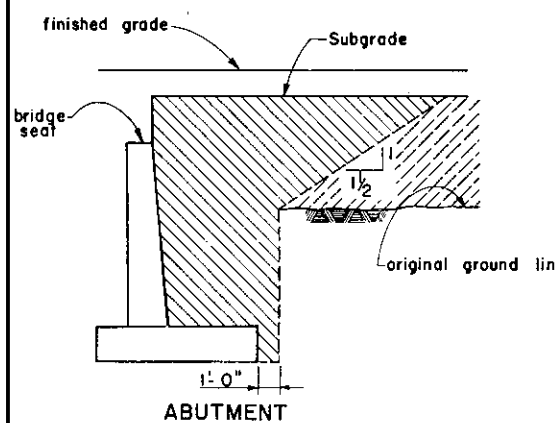


**R.C. TIED ARCH CULVERTS**

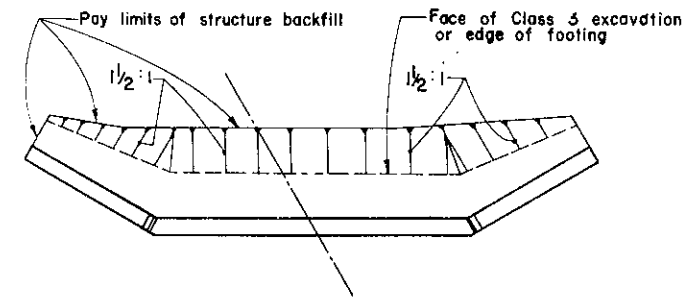
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
**CLASSIFICATION OF EARTHWORK**  
 SHEET 2 OF 2  
 February 24, 1969  
**E-5**



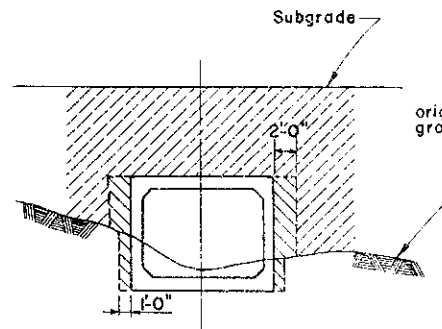
TYPICAL CROSS SECTIONS - ABUTMENTS ON FILL



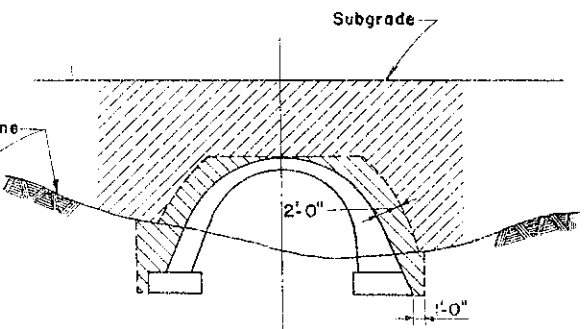
TYPICAL CROSS SECTIONS - ABUTMENTS IN CUT



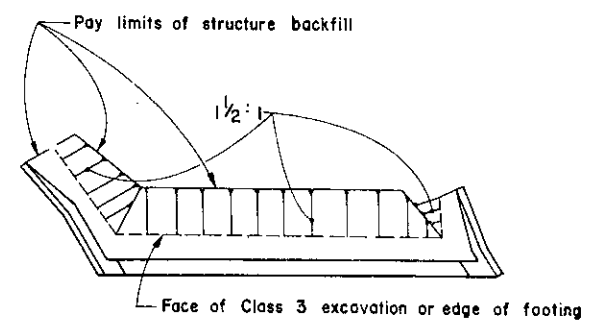
PLAN - ABUTMENT WITH FLARED WINGS



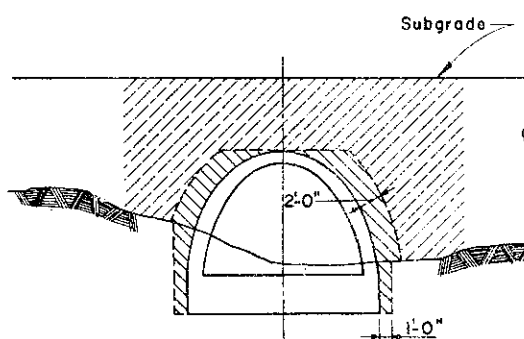
R. C. BOX CULVERT



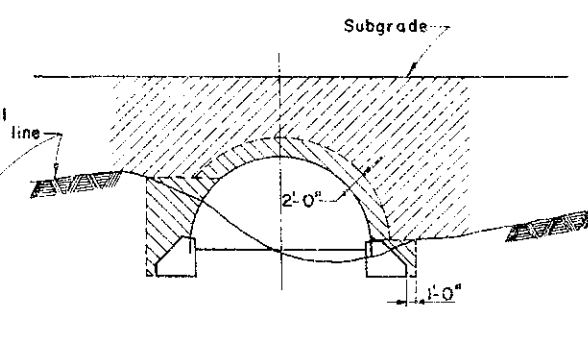
R. C. ARCH CULVERT



PLAN - ABUTMENT WITH U WINGS



R. C. TIED ARCH CULVERT



METAL ARCH CULVERT

BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES

- NOTES**
- Backfill and embankment shall be placed in accordance with this Standard Drawing unless otherwise shown on the structure drawings.
  - No payment will be made for material removed or for structure backfill placed beyond the specified limits of Class 1, 2, 3 or 4 excavation.
  - Structure backfill shall consist of material meeting the requirements of Section 350.2 of Form 408. Rock which can be placed and compacted in layers of 12 inches or less, may be used. However, rock shall not be permitted for structure backfill at metal plate arches.
  - Structure backfill will be measured and paid for as Selected Borrow Excavation (Structure Backfill).
  - Backfill limits at retaining walls and wingwalls for culverts shall be treated the same as flared abutment wingwalls.
  - Backfill construction at R. C. Box Culverts with the top slab at roadway grade shall be treated the same as abutments.
  - Backfill construction at culverts where the top of the culvert is near subgrade shall be considered as a special case and shall be treated as shown on the structure drawings or as directed by the Engineer.
  - Structure backfill and adjoining embankment shall be placed simultaneously unless otherwise permitted by the Engineer.
  - Structure backfill quantities are shown on the structure drawings.
  - Material removed beyond the specified limits of Class 1, 2, 3 or 4 excavation shall be replaced with Structure Backfill.

**LEGEND**

- Structure Backfill
- Embankment Material

Des. S.R.S.  
 Tr'd. J.R.H.  
 Chkd. S.R.S.  
 Prepared by Division of Bridge Engineering

Revised notes to require backfill material to conform with Section 350.2 Form 408  
 Approved December 19, 1969 *David C. Lewis* Deputy Chief Engineer

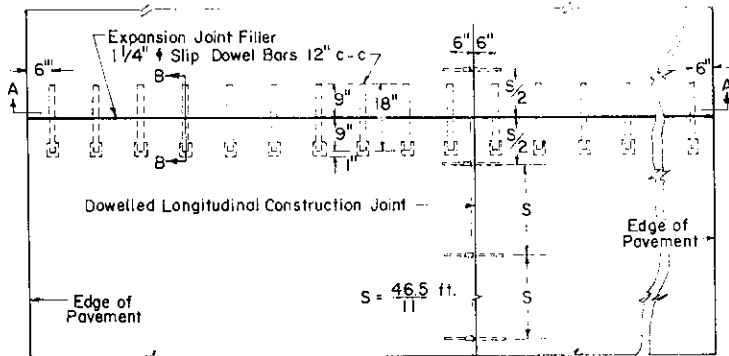
Revised to delete note prohibiting the use of Granulated blast-furnace slag.  
 Approved August 3, 1969 *William A. ...* Chief Engineer

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS

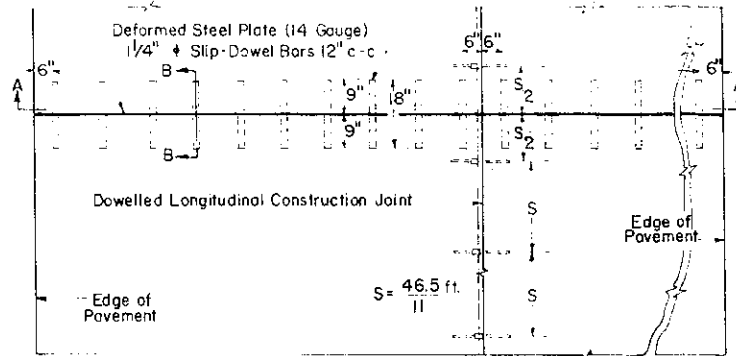
BACKFILL AT STRUCTURES

APPROVED *William A. ...* February 5, 1968  
 CHIEF ENGINEER

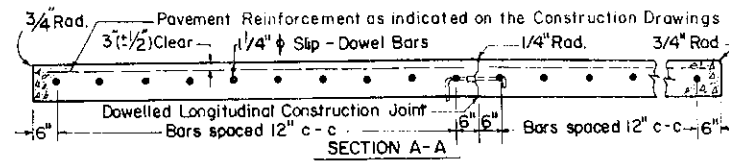
E-6



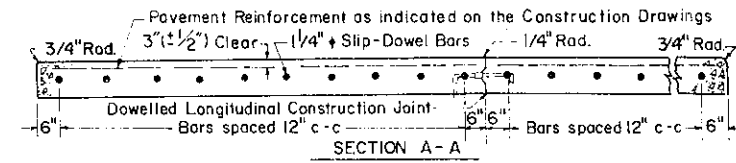
PLAN OF 8, 9, OR 10 INCH UNIFORM DEPTH PAVEMENT



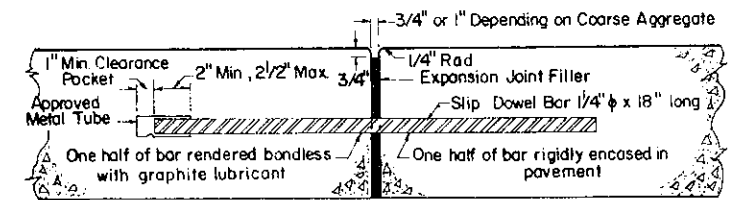
PLAN OF 8, 9, OR 10 INCH UNIFORM DEPTH PAVEMENT



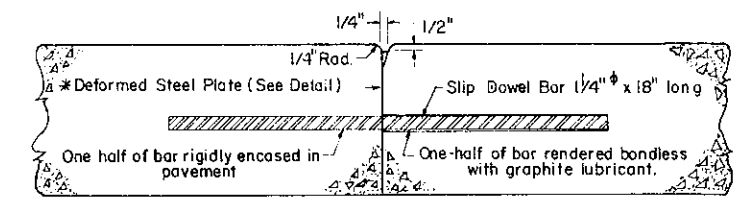
SECTION A-A



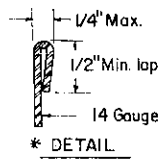
SECTION A-A



SECTION B-B



SECTION B-B



DETAIL

Expansion joint Filler shall have a minimum thickness of 1 inch if slag is used as a coarse aggregate and 3/4 of an inch if stone or gravel is used. It shall be cut to conform to the cross section of the pavement, except that the width shall be 3/4 of an inch less than the depth of the pavement and shall be furnished in strips equal to the width of the pavement slab. The top surface shall be smooth, and holes punched for the slip-dowel bars (load transfer units) shall provide a snug fit without loss in thickness of the material.

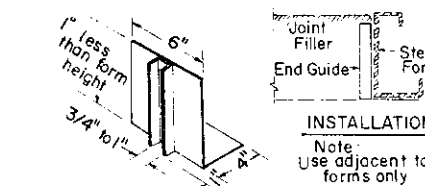
A removable steel joint shield conforming to the crown of the pavement slab shall be used over transverse expansion joints. It shall be not thinner than 12 gauge, U.S. Std., and of sufficient stiffness to retain its shape. It shall be formed to provide a snug fit over the joint material and shall extend downward for a distance sufficient to prevent displacement or bending of the joint material from its vertical position. The ends of the joint shield shall be bevelled as may be necessary to clear mechanical finishing equipment.

An approved metal tube shall be placed over the graphited end of all slip-dowel bars. This tube shall provide a snug fit for a distance of 2 inches and shall provide a minimum 1 inch clearance pocket assured by means of a positive spacing device. Steel end guides shall be not thinner than 16 gauge, U.S. Std., and shall be used at each end of the joint.

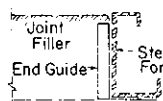
Transverse expansion joints shall be placed in ramp pavements and at other locations where pavement expansions and contractions can not be handled by the pavement relief joint. These locations shall be shown on the construction drawings. Transverse expansion joints in ramp pavements shall be placed at intervals of not over 279 feet. (See DETAIL-A)

The deformed steel plate shall be furnished and placed in each transverse construction joint. It shall be not thinner than 14 gauge, U.S. Std., and free from kinks, warps, bends, etc. The ends of the plate shall be bevelled as may be necessary to clear mechanical finishing equipment and holes for slip-dowel bars (load transfer units) shall provide a reasonably snug fit. No joint shield will be required. Metal tubes will not be required on any slip-dowel bars. \* The deformed steel plate shall be omitted when sawed transverse construction joints are used. Joints shall be placed at intervals of not over 46 1/2 feet and at 46 1/2 feet from expansion joint or pavement relief joints.

**TRANSVERSE CONSTRUCTION OR CONTRACTION JOINTS**



FOR TRANSVERSE EXPANSION JOINTS

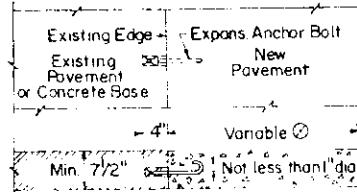


INSTALLATION Note: Use adjacent to forms only

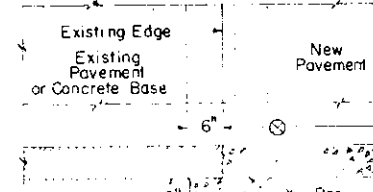
END GUIDES

**TRANSVERSE EXPANSION JOINTS**

Expansion anchor bolts, 5/8 inch in diameter and 11 inches long with 90° to 180° bends, shall be placed in the center of the pavement depth and spaced on 3-foot centers with an additional bolt 12 inches from each side of all transverse joints. The design and quality of the bolts and the number of lead slugs or swedgeing units used, shall be approved by the Department.



EXPANSION ANCHOR BOLT METHOD

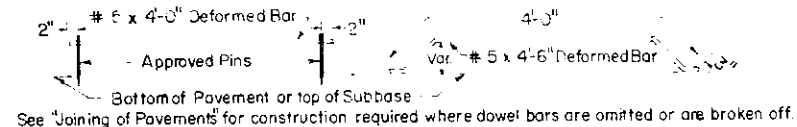


UNDERPINNING METHOD

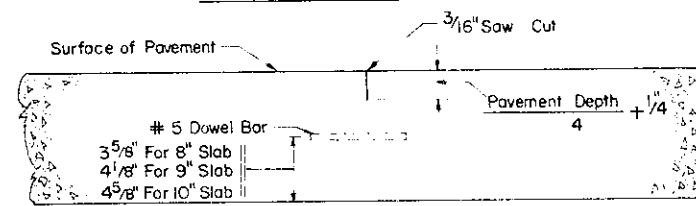
Concrete for underpinning shall be the same mix as, and shall be placed integral with, the new pavement. Excavation made to greater dimensions than those shown for underpinning shall be replaced with concrete, and backfilling with other material will not be permitted. Corner breaks shall be repaired by the underpinning method. The underpinning method should not be used if it will interfere with subbase drainage.

Either method shall be used to join new pavement which is not confined with curbs, except that only the underpinning method shall be used where the depth of existing pavement or concrete base is less than 7 1/2 inches. New pavement confined with curbs, need not be joined. Where dowel bars are broken off or are omitted from dowelled longitudinal construction joints, either an expansion anchor bolt or a 2-foot strip of underpinning shall be used. \* This bar (#4 x 1-6" long) is required only in underpinning where dowel bars are broken off or omitted from longitudinal construction joints. Premolded expansion joint filler shall be cut to the cross section of the new pavement. Two sections of filler, if satisfactorily lapped or clipped together, may be used with the underpinning method. No separate or additional payment will be allowed for materials or labor involved in joining pavement by either method.

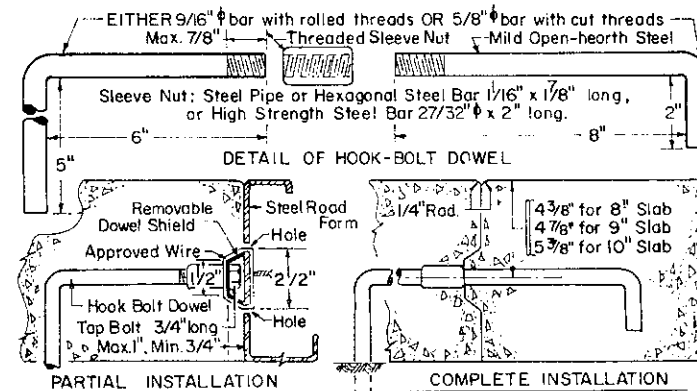
**JOINING OF PAVEMENTS**



ALTERNATE DOWEL BARS



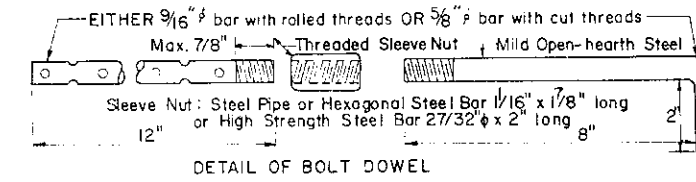
FOR CONSTRUCTION OF TWO LANES AT ONE TIME



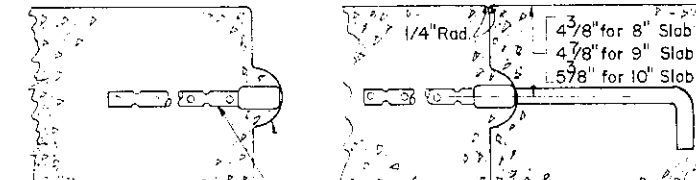
PARTIAL INSTALLATION COMPLETE INSTALLATION

The assembled dowel shall withstand a minimum load of 15,000 pounds. The 5" leg of the dowel will extend into the subgrade for all pavement depths. The dowel shield shall stop 6" to 8" each side of all transverse joints. The removable dowel shield, either steel or iron not thinner than 16 gauge U.S. Std. shall be securely wired to the steel forms. Holes in the shield shall be punched so as to permit the placing of the hook bolt dowels in the shield at the required spacings. Two holes shall be provided in the roadway forms 2 1/2" apart vertically, for wiring the dowel bar shield in the slab, with a maximum horizontal spacing of 3 feet between sets of holes.

**HOOK-BOLT DOWEL & REMOVABLE DOWEL SHIELD FOR CONSTRUCTION OF ONE LANE AT A TIME**



PARTIAL INSTALLATION COMPLETE INSTALLATION



BOLT DOWEL ASSEMBLY FOR USE WITH SLIP FORM PAVING EQUIPMENT

The assembly dowel shall withstand a minimum load of 15,000 lbs. Manual placing of dowel assemblies will not be permitted.

**DOWELLED LONGITUDINAL CONSTRUCTION JOINTS**

**GENERAL NOTES**

**LOAD TRANSFER UNITS FOR TRANSVERSE EXPANSION AND TRANSVERSE CONSTRUCTION JOINTS**

Slip-dowel bars of the size, spacing and position shown on this drawing may be used as load transfer units in all transverse expansion and construction joints. The center of bars shall be located vertically at least 3 1/2 inches below the finish pavement surface or 3 1/2 inches above the theoretical bottom of pavement or between these limits as desired.

The perimeter of the free end of all slip-dowel bars in expansion and construction joints shall be a true circle and free from burrs. One-half the length of each bar shall be rendered bondless by a coating of graphite lubricant, and this half of the bars in a transverse joint assembly shall be placed all on one side of the joint or may be placed alternately on either side of said joint. The uncoated half of the bar shall be rigidly encased in the pavement.

This Standard does not indicate details for the method of supporting the slip-dowel bars required as load transfer units in all transverse expansion and transverse construction joints. A drawing (22 inches by 36 inches) showing necessary assembly details for supporting the bars in correct vertical and horizontal position for expansion and for construction joint assemblies shall be prepared by the manufacturer or his representative, and it shall be submitted to and approved by the Chief Engineer prior to furnishing assemblies on any purchase order or for use on any contract.

**CLEFT TYPE JOINTS**

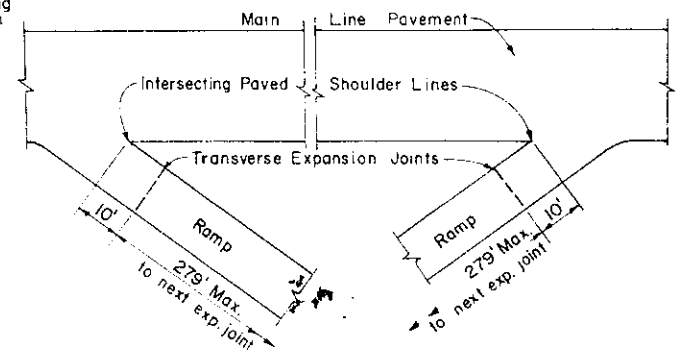
Cleft type dowelled longitudinal construction joints will not be permitted.

**PAVEMENT WIDENING**

Pavement which is 4 feet or less in width shall be reinforced longitudinally with two #5 bars, each placed and held securely by an approved method 4 inches from the edges and 3 1/2" clear below the surface of the pavement. The minimum top of bars shall be 12 inches.

Pavement which is more than 4 feet in width shall be reinforced with the approved type required on the construction drawings, or specified for the project. Transverse expansion joints shall be placed opposite existing expansion joints, except that they shall not be closer than 46 1/2 feet. Transverse construction joints shall be placed opposite existing construction joints, cleft-type joints or cracks, except that they shall not be closer than 24 feet to adjacent transverse expansion or construction joints.

**DETAIL - A**



**LOCATION OF FIRST TRANSVERSE EXPANSION JOINT IN RAMP PAVEMENT**

Revised the depth of placement of pavement reinforcement and spacing of longitudinal dowel bars.  
Revised to prohibit the manual placement of bolt dowels.  
Approved April 29, 1970 Chief Engineer *W. A. ...*

Revised to add Swedge-Bolt Dowel Assembly for use with Slip Form Paving and Detail-A.  
Approved April 11, 1969 Chief Engineer *W. A. ...*

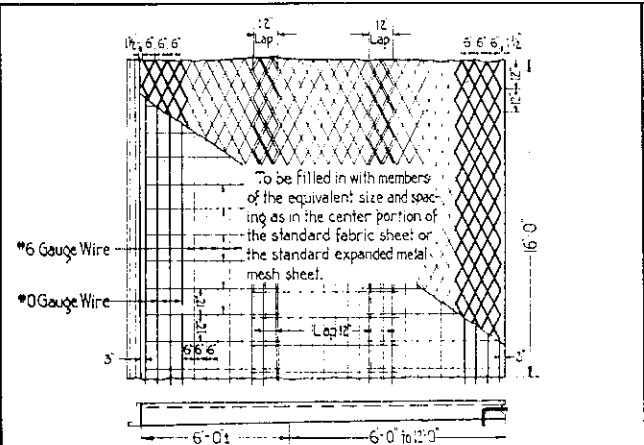
Redrawn and approved April 2, 1968  
Revised construction joint spacing & criteria for placing expansion joints

**COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF HIGHWAYS REINFORCED CEMENT CONCRETE PAVEMENT**

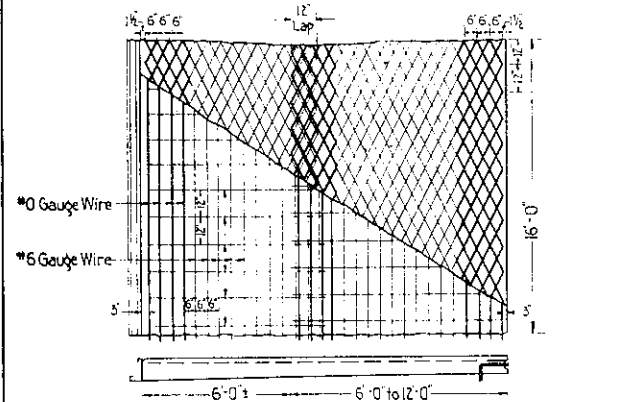
APPROVED APRIL 2, 1968

*W. A. ...*  
CHIEF ENGINEER

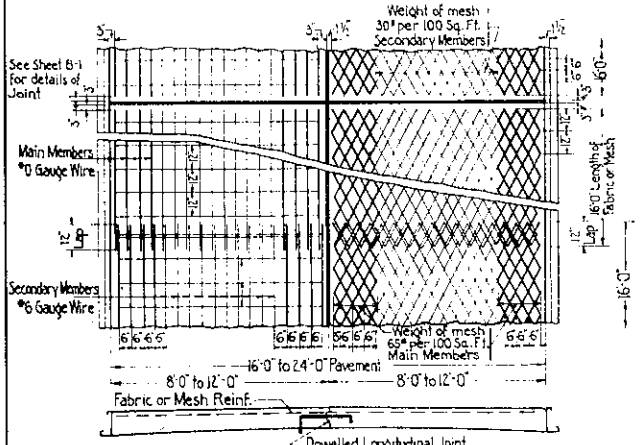
B-1



METHOD OF PLACING FABRIC OR EXPANDED METAL MESH WHERE THE WIDTH OF SLAB IS MORE THAN STANDARD WIDTH BY SPLITTING THE STANDARD SHEET AND SPREADING THE EDGE SECTIONS



METHOD OF PLACING FABRIC OR EXPANDED METAL MESH WHERE THE WIDTH OF SLAB VARIES FROM THE STANDARD WIDTH, BY ADDING ALONG ONE EDGE THE REQUIRED PORTION OF A FABRIC SHEET OR EXPANDED METAL MESH SHEET WITH THE HEAVY EDGE MEMBERS ADJACENT TO THE EDGE OF THE SLAB. THE SAME METHOD OF PLACING FABRIC OR EXPANDED METAL MESH WILL BE USED FOR SLABS LESS THAN STANDARD WIDTH UNLESS SPECIAL SHEETS FOR REQUIRED WIDTH ARE FURNISHED



METHOD OF LAPPING FABRIC OR EXPANDED METAL MESH PERPENDICULAR TO  $\phi$  OF ROAD

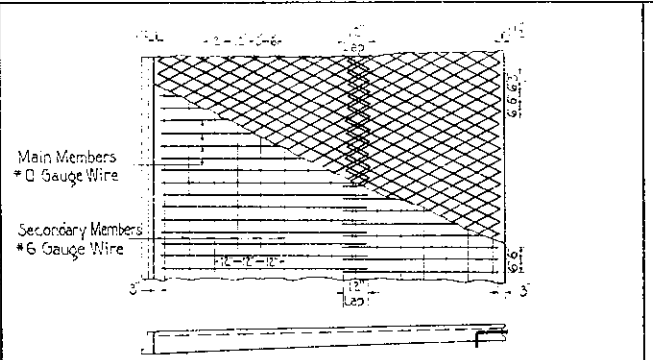
**FABRIC REINFORCEMENT NOTES**

Fabric Reinforcement shall consist of members rigidly attached at all joints or points of intersection. The size and spacing of main and secondary members shall be as shown on this drawing. The minimum lap of Fabric shall be twelve (12) inches from end to end of the wires measured along the line of the lap of the wires.

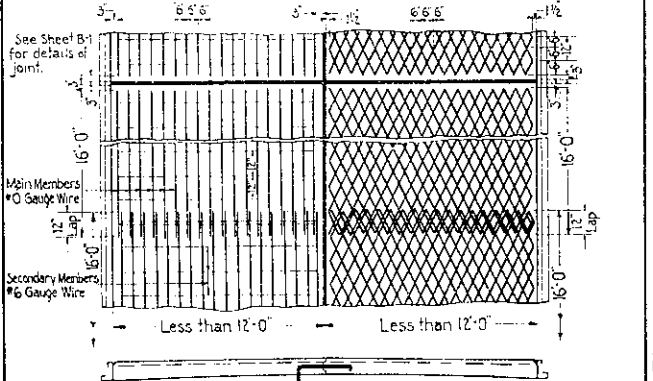
**EXPANDED METAL MESH REINFORCEMENT NOTES**

The diamonds in the mesh shall be twelve (12) inches long and not less than five (5) inches nor more than six and one-half (6 1/2) inches in width. The weight and spacing of main and secondary members shall be as shown on this drawing. The minimum lap of Expanded Metal Mesh Reinforcement shall be twelve (12) inches or two (2) diamonds transversely and twelve (12) inches or one (1) diamond longitudinally.

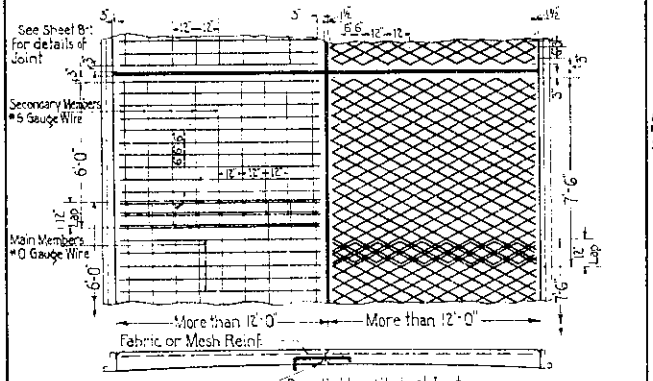
TYPE A REINFORCEMENT - FABRIC OR EXPANDED METAL MESH



LAPPING REINFORCEMENT PARALLEL TO  $\phi$  OF ROAD



LAPPING REINFORCEMENT AT RIGHT-ANGLES TO  $\phi$  OF ROAD



LAPPING REINFORCEMENT AT RIGHT-ANGLES TO  $\phi$  OF ROAD

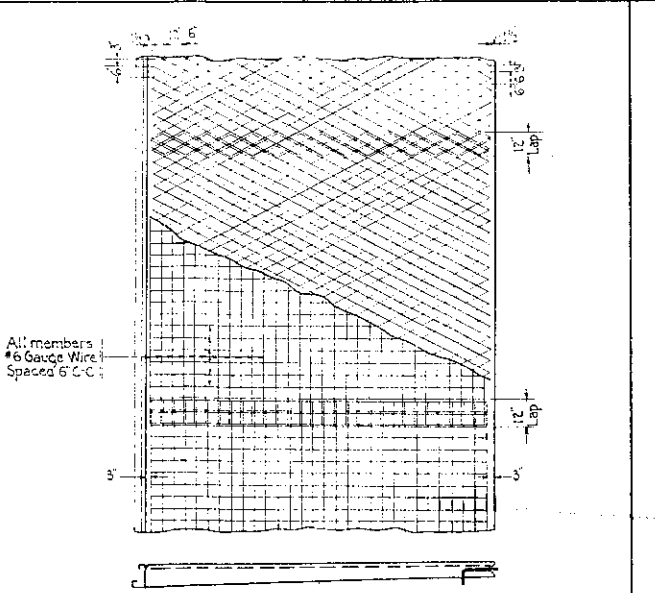
**FABRIC REINFORCEMENT NOTES**

Fabric Reinforcement shall consist of members rigidly attached at all joints or points of intersection and shall have an effective weight of not less than sixty-five (65) pounds per one-hundred (100) square feet. The size and spacing of main and secondary members shall be as shown on this drawing. The Fabric Reinforcement shall be placed in slabs twelve (12) feet or more in width with the main members at right-angles to the center line of the roadway and the secondary members parallel to the center line of the roadway. In slabs less than twelve (12) feet in width, the main members may be placed parallel to the center line of the roadway and the secondary members at right-angles to the center line of the roadway. The minimum lap of Fabric shall be twelve (12) inches from end to end of the wires measured along the line of the lap of the wires.

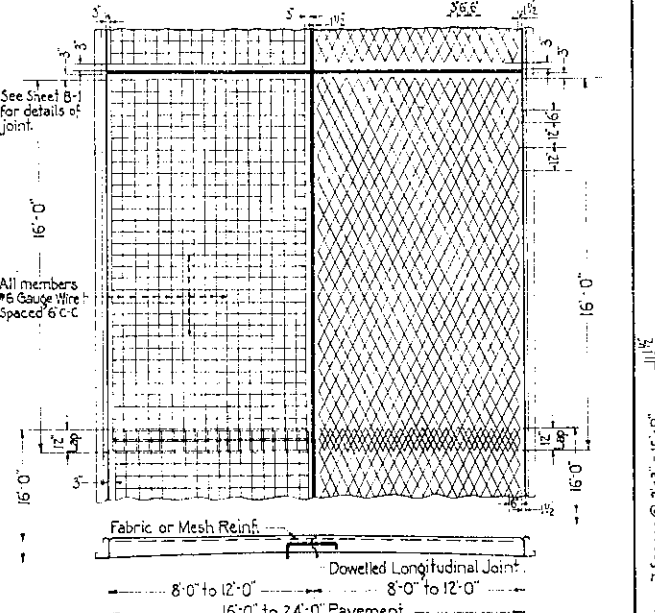
**EXPANDED METAL MESH REINFORCEMENT NOTES**

The Expanded Metal Mesh Reinforcement shall have an effective weight of not less than sixty-five (65) pounds per one-hundred (100) square feet. The diamonds in the mesh shall be twelve (12) inches long and not less than five (5) inches nor more than six and one-half (6 1/2) inches in width. The Expanded Metal Mesh Reinforcement shall be placed in slabs twelve (12) feet or more in width with the twelve (12) inch length of diamonds at right-angles to the center line of the roadway. In slabs less than twelve (12) feet in width, the twelve (12) inch length of the diamonds may be placed parallel to the center line of the roadway. The minimum lap of the Expanded Metal Mesh Reinforcement shall be two (2) diamonds transversely or one (1) diamond longitudinally as shown.

TYPE C REINFORCEMENT - FABRIC OR EXPANDED METAL MESH



METHOD OF PLACING FABRIC OR EXPANDED METAL MESH WHERE THE WIDTH OF SLAB IS MORE THAN TEN FEET



METHOD OF LAPPING FABRIC OR EXPANDED METAL MESH AT RIGHT-ANGLES TO  $\phi$  OF ROAD

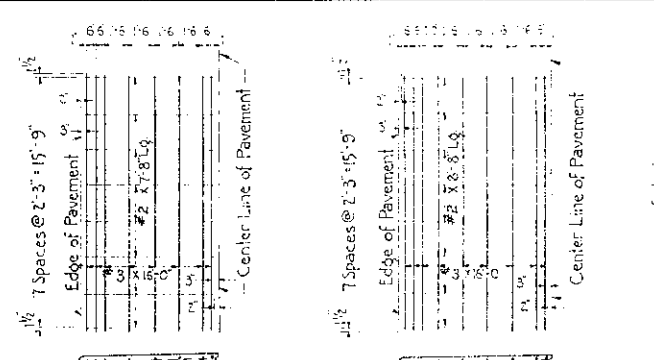
**FABRIC REINFORCEMENT NOTES**

Fabric Reinforcement shall consist of members rigidly attached at all joints or points of intersection and shall have an effective weight of not less than forty-two (42) pounds per one-hundred (100) square feet. All members of the Fabric shall be number six (6) gauge wire spaced six (6) inches apart as shown on this drawing. The minimum lap of Fabric shall be twelve (12) inches measured from end cross wires.

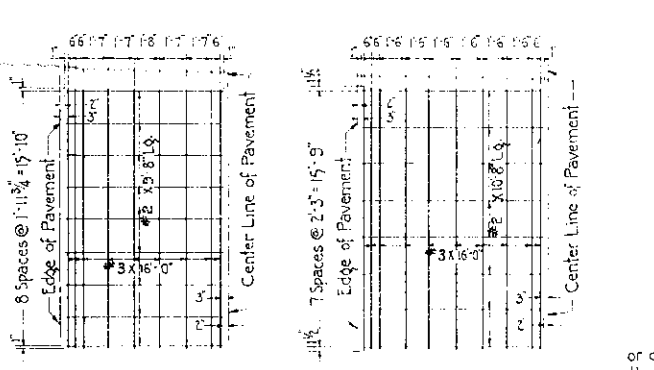
**EXPANDED METAL MESH REINFORCEMENT NOTES**

The Expanded Metal Mesh Reinforcement shall have an effective weight of not less than forty-two (42) pounds per one-hundred (100) square feet. The diamonds in the mesh shall be twelve (12) inches long and not less than five (5) inches nor more than six and one-half (6 1/2) inches in width. The minimum lap of Expanded Metal Mesh Reinforcement shall be twelve (12) inches.

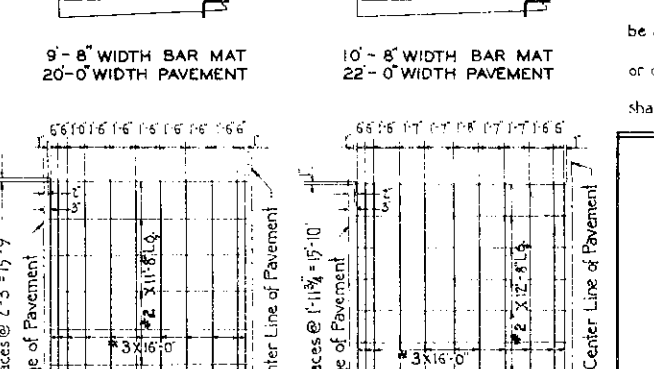
TYPE E REINFORCEMENT - FABRIC OR EXPANDED METAL MESH



7-8" WIDTH BAR MAT 16-0" WIDTH PAVEMENT

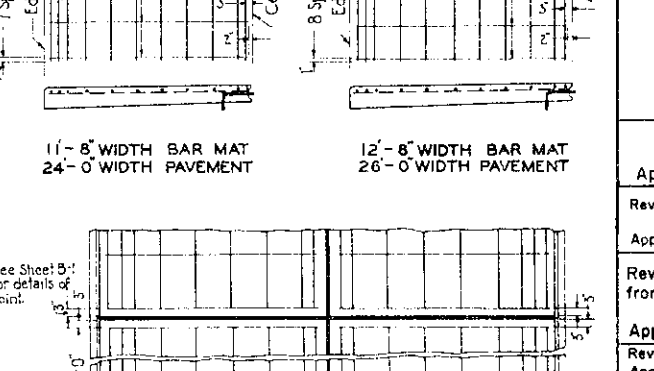


6-8" WIDTH BAR MAT 18-0" WIDTH PAVEMENT



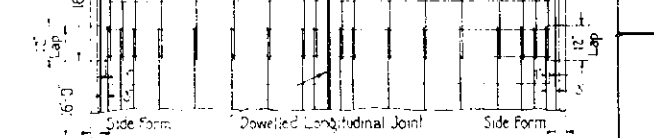
9-8" WIDTH BAR MAT 20-0" WIDTH PAVEMENT

10-8" WIDTH BAR MAT 22-0" WIDTH PAVEMENT

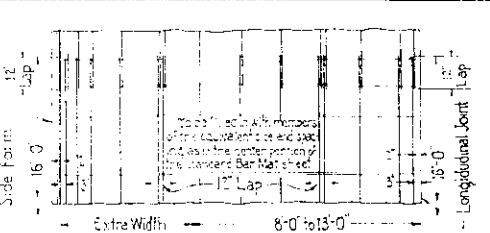


11-8" WIDTH BAR MAT 24-0" WIDTH PAVEMENT

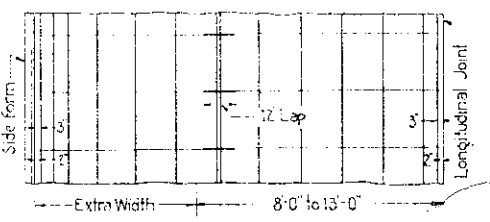
12-8" WIDTH BAR MAT 26-0" WIDTH PAVEMENT



METHOD OF LAPPING BAR MAT PERPENDICULAR TO  $\phi$  OF ROAD TYPE D REINFORCEMENT - BAR MAT



METHOD OF PLACING BAR MAT WHERE THE WIDTH OF SLAB IS MORE THAN THE STANDARD WIDTH, BY SPLITTING THE STANDARD MAT AND SPREADING TO EDGE SECTIONS



METHOD OF PLACING BAR MAT WHERE THE WIDTH OF SLAB IS MORE THAN THE STANDARD WIDTH, BY ADDING ALONG ONE EDGE THE REQUIRED PORTION OF MAT WITH THE THREE SIX (6) INCH SPACED BARS AT THE OUTER EDGE OF THE PAVEMENT. THIS SAME METHOD OF PLACING MATS WILL BE USED FOR SLABS LESS THAN THE REQUIRED WIDTH, UNLESS SPECIAL MATS FOR REQUIRED WIDTH ARE FURNISHED.

**BAR MAT REINFORCEMENT NOTES**

Bar Mat Reinforcement shall consist of members rigidly welded or clipped at all joints or points of intersection in accordance with the Department's Specifications, Form 408. The size and spacing of main and secondary members shall be as shown on this drawing. All mats shall be made with bars of an approved deformed section or of plain rods. The minimum lap of the mats both longitudinally and transversely shall be twelve (12) inches as shown.

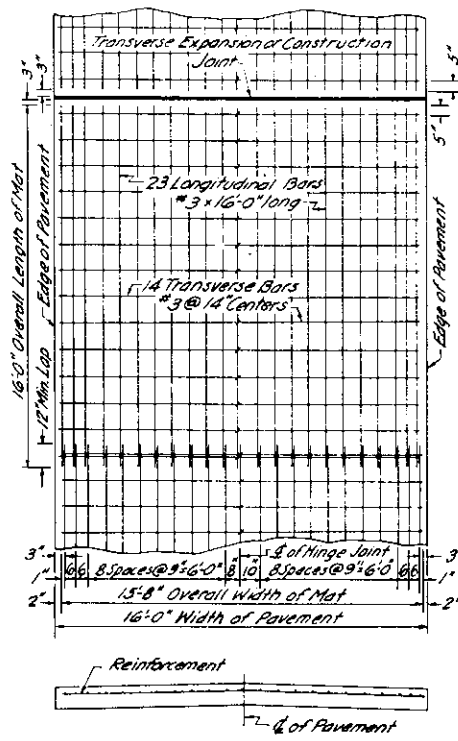
**GENERAL NOTES**

Pavement reinforcement shall be placed 3" (3/2) clear, below pavement surface. All types of reinforcement may be furnished with an approved type of hinged joint. The spacing of longitudinal members affected by the hinge shall not vary more than 1 inch from the spacings shown on these drawings. The hinge shall be placed parallel to the  $\phi$  of the pavement. All types of reinforcement, if not assembled on the project, shall be delivered in flat sheets of the indicated dimensions at the site of the work. For variable width pavement and for widths not shown, the mats, sheets or mesh shall be cut as required and placed with the closely spaced or heavy members adjacent to the pavement edges.

Approved April 29, 1970  
 Revised Sheet 5 of 5  
 Approved March 7, 1969  
 Revised to delete Type B, Reinforcement, Diamond Bar Mat, from Sheet 2  
 Approved February 5, 1948  
 Revised for addition of Sheet 5: Types F & J Reinf. Fabric, Waxed.  
 Approved April 2, 1932

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 STANDARD TYPES OF REINFORCEMENT  
 APPROVED May 13, 1958  
 CHIEF ENGINEER

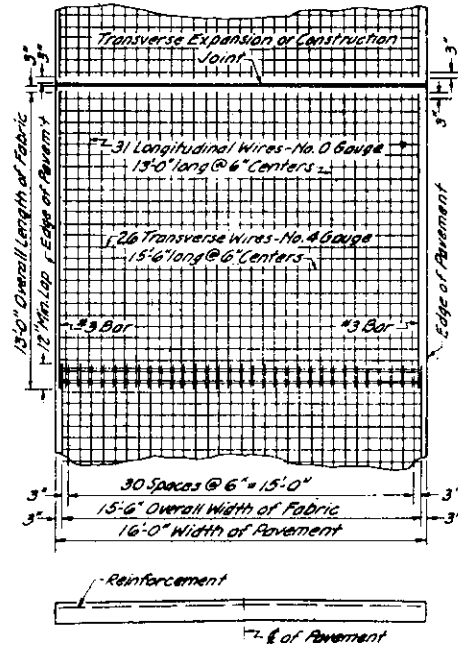




16'-0" Overall Length of Mat  
12" Min. Lap / Edge of Pavement  
23 Longitudinal Bars #3 x 16'-0" long  
14 Transverse Bars #3 @ 14' Centers  
15'-8" Overall Width of Mat  
16'-0" Width of Pavement  
Reinforcement  
15'-8" WIDTH BAR MAT  
16'-0" WIDTH PAVEMENT LANE

Bar Mats shall conform to Department Specifications - Form 408.  
Mats shall consist of No. 3 bars of approved section, spaced as shown.  
Mats shall be placed with minimum laps of 12 inches.

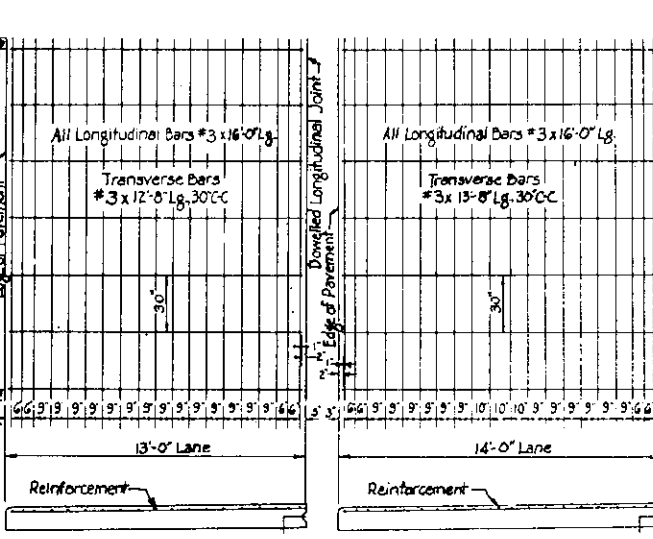
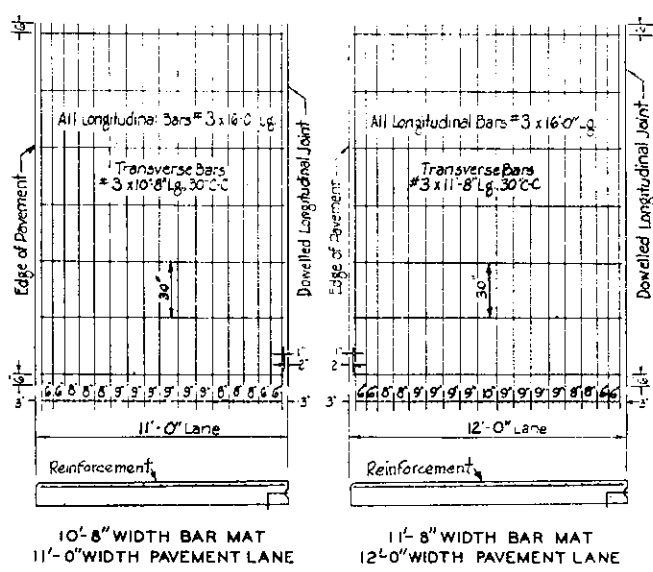
TYPE "H" REINFORCEMENT - BAR MAT



16'-0" Overall Length of Fabric  
12" Min. Lap / Edge of Pavement  
31 Longitudinal Wires - No. 0 Gauge  
15'-0" long @ 6" Centers  
26 Transverse Wires - No. 4 Gauge  
15'-6" long @ 6" Centers  
30 Spaces @ 6" = 15'-0"  
15'-6" Overall Width of Fabric  
16'-0" Width of Pavement  
Reinforcement  
15'-6" WIDTH FABRIC  
16'-0" WIDTH PAVEMENT LANE

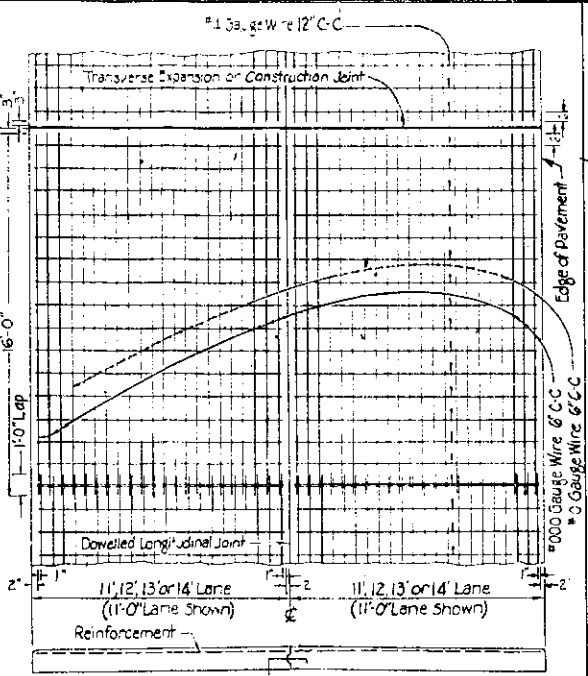
Steel Wire Fabric shall conform to Department Specifications Form 408.  
Fabric shall consist of Nos. 0 & 4 gauge wires with one No. 3 bar of approved section along each pavement edge. Bars may be placed in the field.  
Fabric shall be placed with minimum laps of 12 inches.

TYPE J REINFORCEMENT - FABRIC



TYPE G REINFORCEMENT - BAR MAT

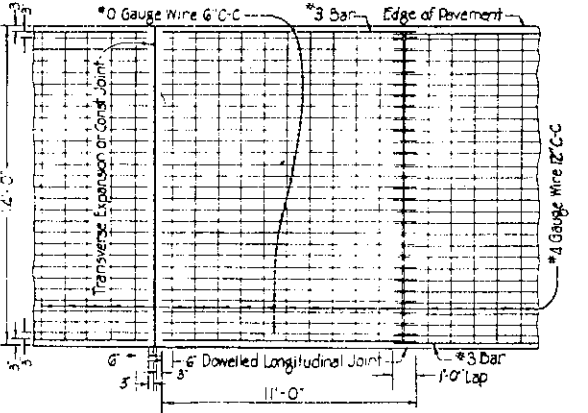
Bar Mat Reinforcement shall consist of members rigidly welded or clipped at all joints or points of intersection in accordance with the Department's Specifications, Form 408.  
All mats shall be made with #3 bars of an approved deformed section or of plain rods.  
The spacing of bars shall be as shown on this drawing.  
The minimum lap of mats both longitudinally and transversely shall be twelve (12) inches as shown for Type D Reinforcement on Sheet 1.



The number and spacing of #4 and #000 gauge wires for 11-foot, 12-foot, 13-foot and 14-foot width of pavement lanes shall be as shown above.

11-foot width lane	requires sixteen (16) #0 gauge wires 6" C-C
12 " " " "	eighteen (18) " " " "
13 " " " "	twenty (20) " " " "
14 " " " "	twentytwo (22) " " " "

REINFORCEMENT AND METHOD OF LAPPING AT RIGHT-ANGLES TO C OF ROAD



Fabric Reinforcement shall consist of members rigidly attached at all joints or points of intersection in accordance with the Department's Specifications, Form 408.  
The size and spacing of the wire members shall be as shown on this drawing.  
The minimum lap of reinforcement shall be twelve (12) inches from end to end of the wires measured along the line of the lap of the wires as shown for Type A Fabric Reinforcement on Sheet 1.  
The methods of placing reinforcement shall be similar to those shown for Type A Reinforcement - Fabric on Sheet 1.  
The #3 bar along each pavement edge (alternate reinforcement for 14-foot width pavement lane) shall be of approved section and may be placed in the field.

TYPE F REINFORCEMENT - FABRIC

**NOTES**

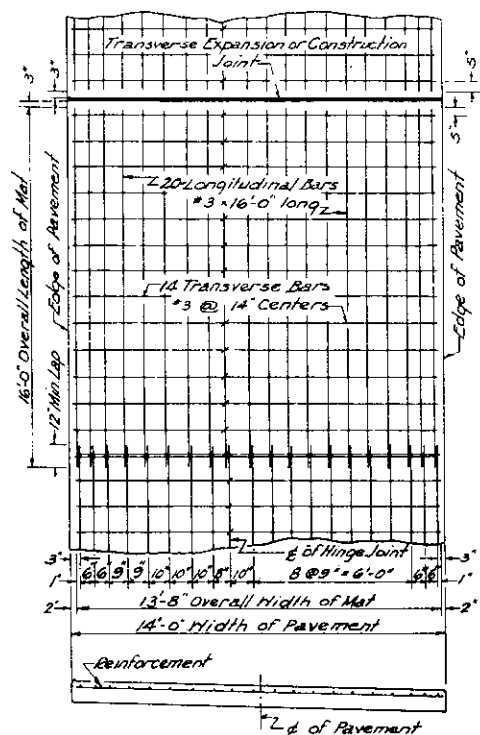
The methods of placing Types G and H reinforcement shall be similar to those shown for type D on Sheet 1.

Type F reinforcement - expanded metal mesh is shown on Sheet 4.

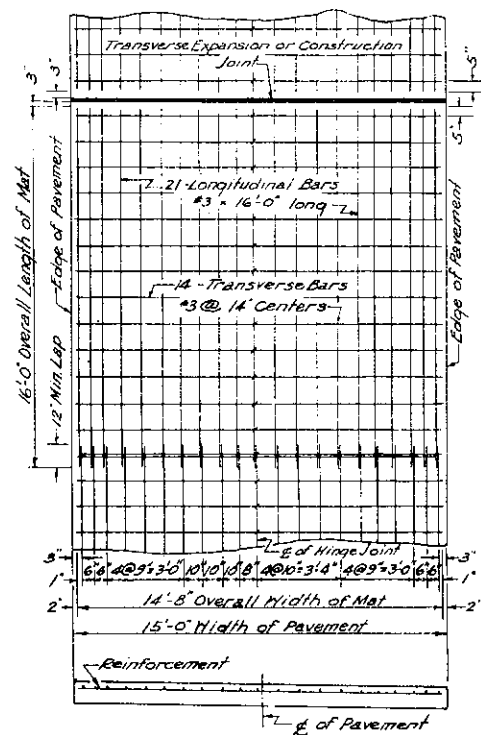
Types H and J reinforcement shown on this sheet are for use with 16 foot width pavement lanes without longitudinal joint. Types H and J reinforcement for 14 foot, 15 foot, 17 foot and 18 foot width pavement lanes are shown on Sheet 3.

Type F and J reinforcement with approved hinges are shown on Sheet 5.

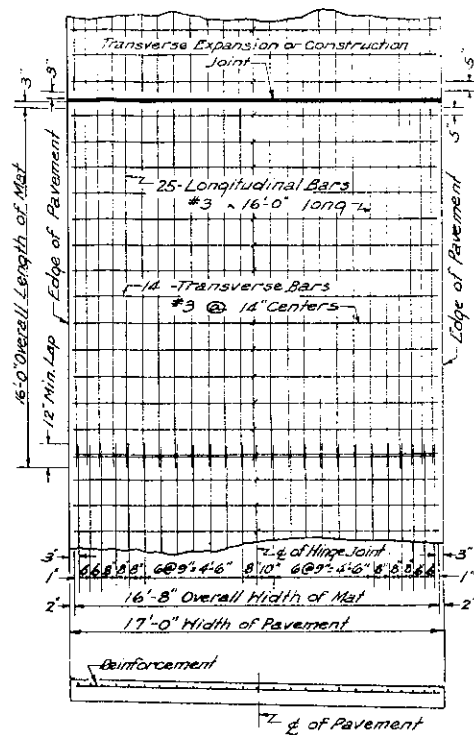
Pavement reinforcement shall be placed 3" (± 1/2"), clear, below pavement surface.



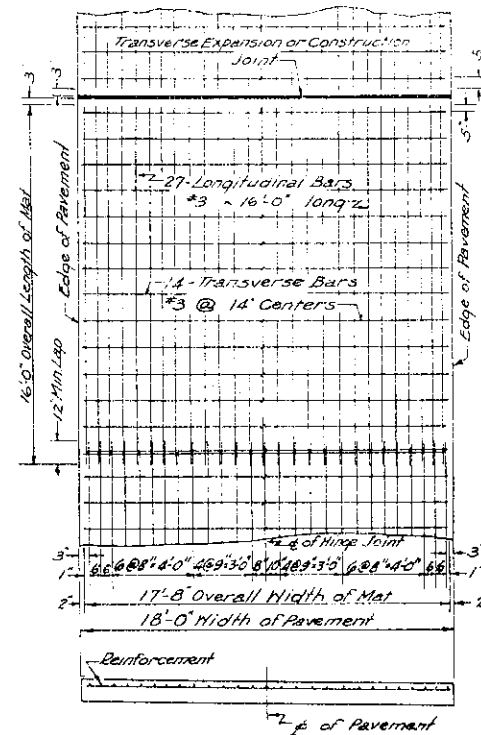
13'-8" WIDTH BAR MAT  
14'-0" WIDTH PAVEMENT LANE



14'-8" WIDTH BAR MAT  
15'-0" WIDTH PAVEMENT LANE

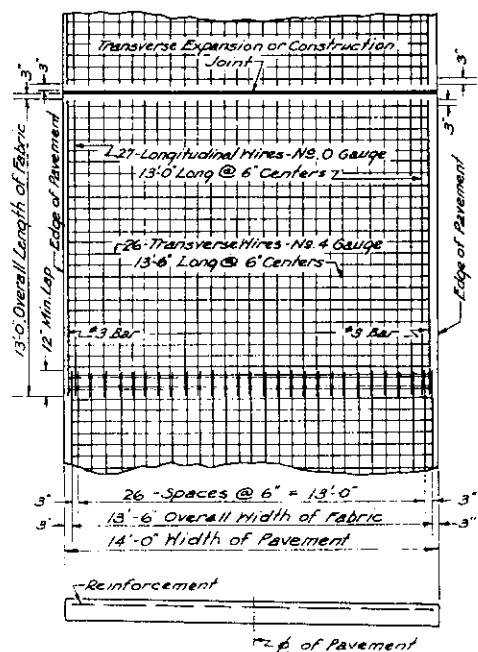


16'-8" WIDTH BAR MAT  
17'-0" WIDTH PAVEMENT LANE

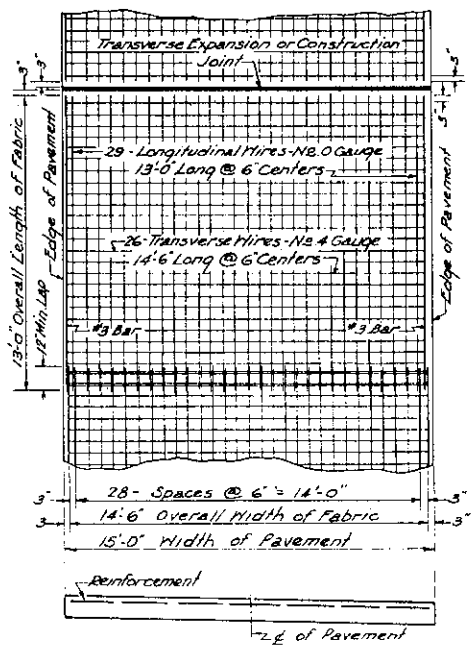


17'-8" WIDTH BAR MAT  
18'-0" WIDTH PAVEMENT LANE

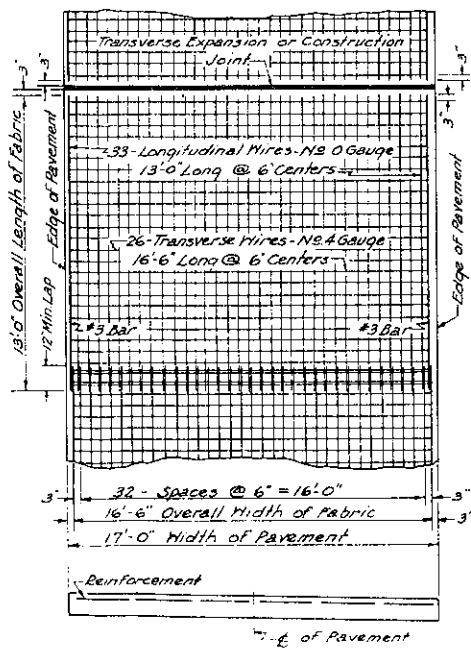
**TYPE H REINFORCEMENT - BAR MAT**



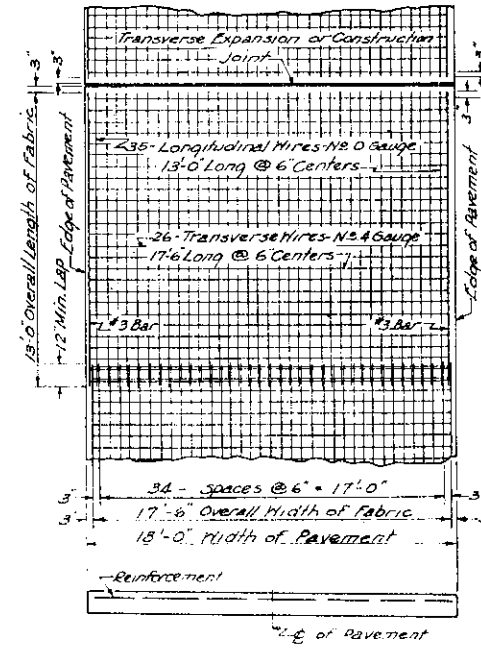
13'-6" WIDTH FABRIC  
14'-0" WIDTH PAVEMENT LANE



14'-6" WIDTH FABRIC  
15'-0" WIDTH PAVEMENT LANE



16'-6" WIDTH FABRIC  
17'-0" WIDTH PAVEMENT LANE



17'-6" WIDTH FABRIC  
18'-0" WIDTH PAVEMENT LANE

**TYPE J REINFORCEMENT - FABRIC**

**NOTES**

Types H and J reinforcement are for use with 14-foot, 15-foot, 16-foot, 17-foot and 18-foot width pavement lanes without longitudinal joint.

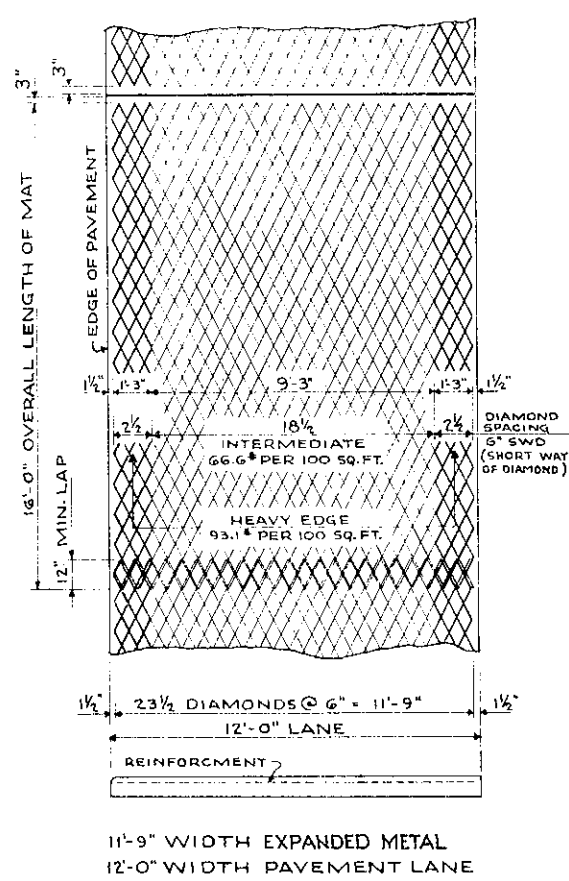
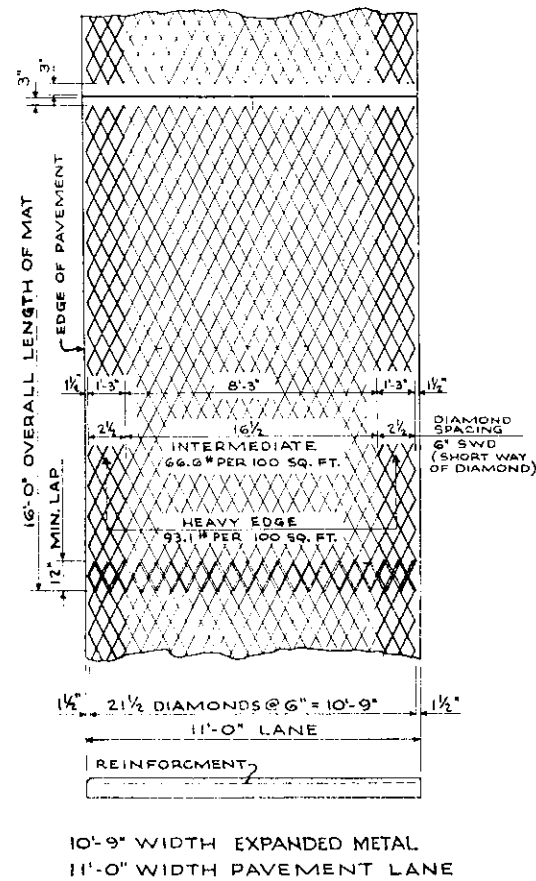
Types H and J reinforcement for 16-foot width pavement lane are shown on Sheet 2.

Type H - Bar Mat:  
Bar mats shall conform to Department Specifications - Form 408.  
Mats shall consist of No. 3 bars of approved section spaced as shown.  
Mats shall be placed with minimum laps of 12 inches.

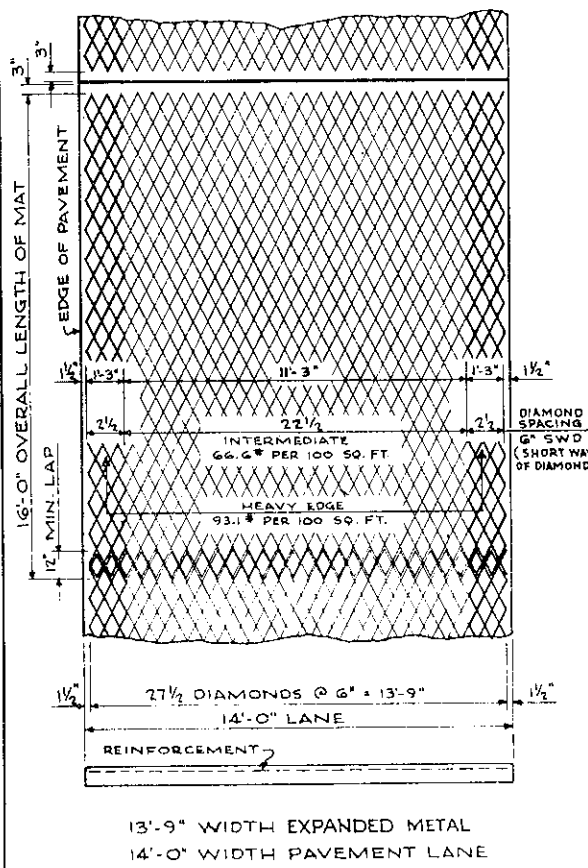
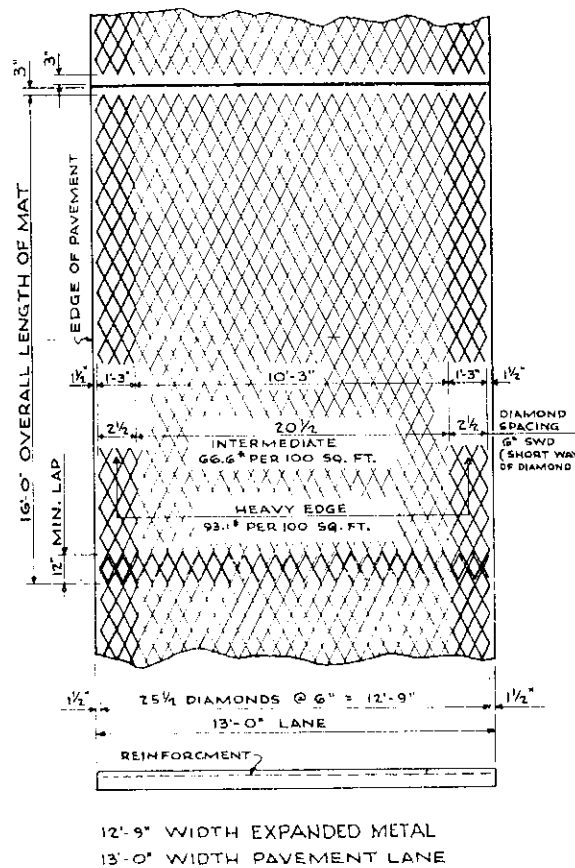
Type J - Fabric:  
Steel wire fabric shall conform to Department Specifications - Form 408.  
Fabric shall consist of Nos. 4 and 6 gauge wires spaced as shown with one No. 3 bar of approved section along each pavement edge.  
Bars may be placed in the field.  
Fabric shall be placed with minimum laps of 12 inches.  
Fabric with approved hinges is shown on Sheet 5.

Pavement reinforcement shall be placed 3" (± 1/2") clear, below pavement surface

**STANDARD TYPES OF REINFORCEMENT**



**TYPE F REINFORCEMENT-EXPANDED METAL MESH**



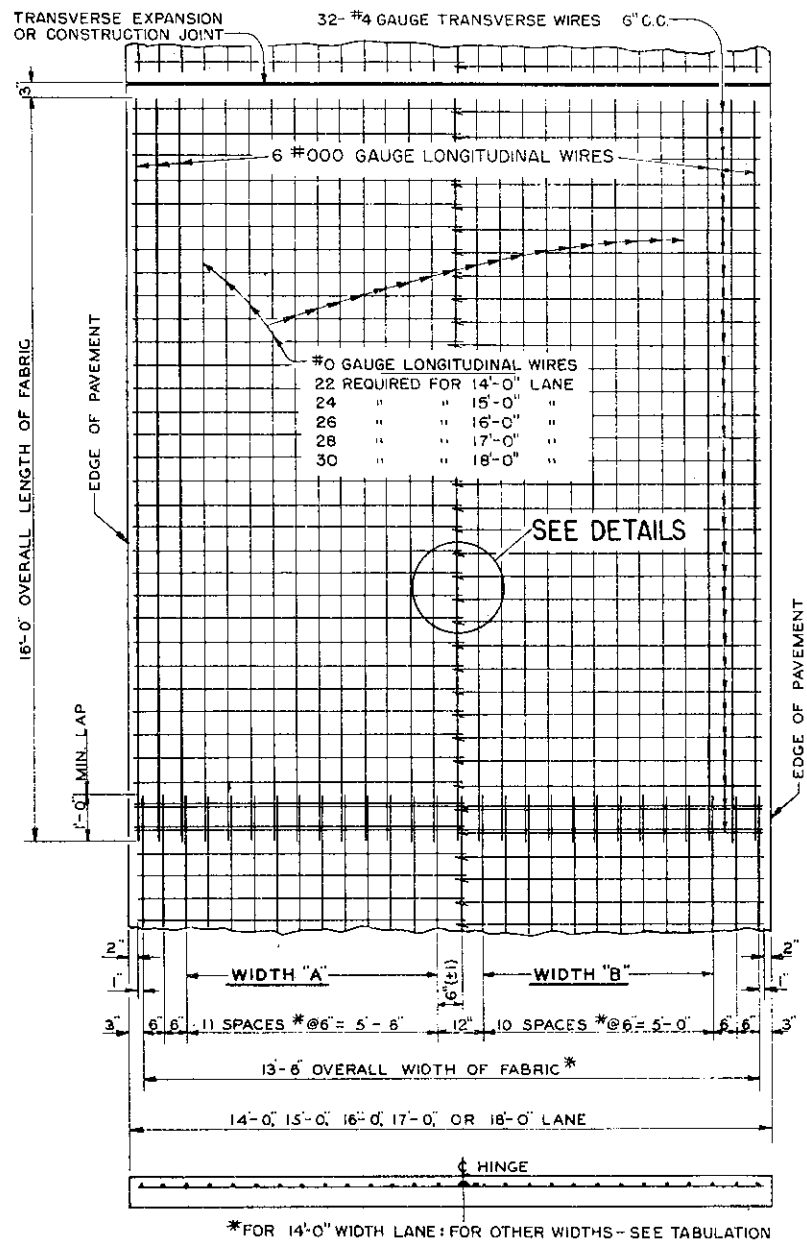
**NOTES**

TYPE F - EXPANDED METAL MESH:  
Where Type F reinforcement is indicated on the drawings or specified, either Type F expanded metal mesh or Type F fabric (wire-as shown on Sheet 2) may be used.  
The diamonds of the mesh shall be 12 inches long and not less than 5 nor more than 6 1/2 inches in width. The weights shall be not less than those shown. The minimum lap shall be 12 inches or 1 diamond longitudinally as shown.  
Mesh shall be placed with minimum laps of 12 inches. Pavement reinforcement shall be placed 3" (±1/2"), clear, below pavement surface.

STANDARD TYPES OF REINFORCEMENT

27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850. 851. 852. 853. 854. 855. 856. 857. 858. 859. 860. 861. 862. 863. 864. 865. 866. 867. 868. 869. 870. 871. 872. 873. 874. 875. 876. 877. 878. 879. 880. 881. 882. 883. 884. 885. 886. 887. 888. 889. 890. 891. 892. 893. 894. 895. 896. 897. 898. 899. 900. 901. 902. 903. 904. 905. 906. 907. 908. 909. 910. 911. 912. 913. 914. 915. 916. 917. 918. 919. 920. 921. 922. 923. 924. 925. 926. 927. 928. 929. 930. 931. 932. 933. 934. 935. 936. 937. 938. 939. 940. 941. 942. 943. 944. 945. 946. 947. 948. 949. 950. 951. 952. 953. 954. 955. 956. 957. 958. 959. 960. 961. 962. 963. 964. 965. 966. 967. 968. 969. 970. 971. 972. 973. 974. 975. 976. 977. 978. 979. 980. 981. 982. 983. 984. 985. 986. 987. 988. 989. 990. 991. 992. 993. 994. 995. 996. 997. 998. 999. 1000.

SHEET 4 OF 5  
B-2



\*FOR 14'-0" WIDTH LANE: FOR OTHER WIDTHS--SEE TABULATION

**TYPE J REINFORCEMENT-FABRIC, HINGED**

WHERE LANES WIDER THAN 14'-0" ARE USED, THE FOLLOWING DIMENSIONS APPLY

| LANE WIDTH | WIDTH A               | WIDTH B               | OVERALL WIDTH OF FABRIC |
|------------|-----------------------|-----------------------|-------------------------|
| 15'-0"     | 12 SPACES @ 6"= 6'-0" | 11 SPACES @ 6"= 5'-6" | 14'-6"                  |
| 16'-0"     | 13 " @ 6"= 6'-6"      | 12 " @ 6"= 6'-0"      | 15'-6"                  |
| 17'-0"     | 14 " @ 6"= 7'-0"      | 13 " @ 6"= 6'-6"      | 16'-6"                  |
| 18'-0"     | 15 " @ 6"= 7'-0"      | 14 " @ 6"= 7'-0"      | 17'-6"                  |

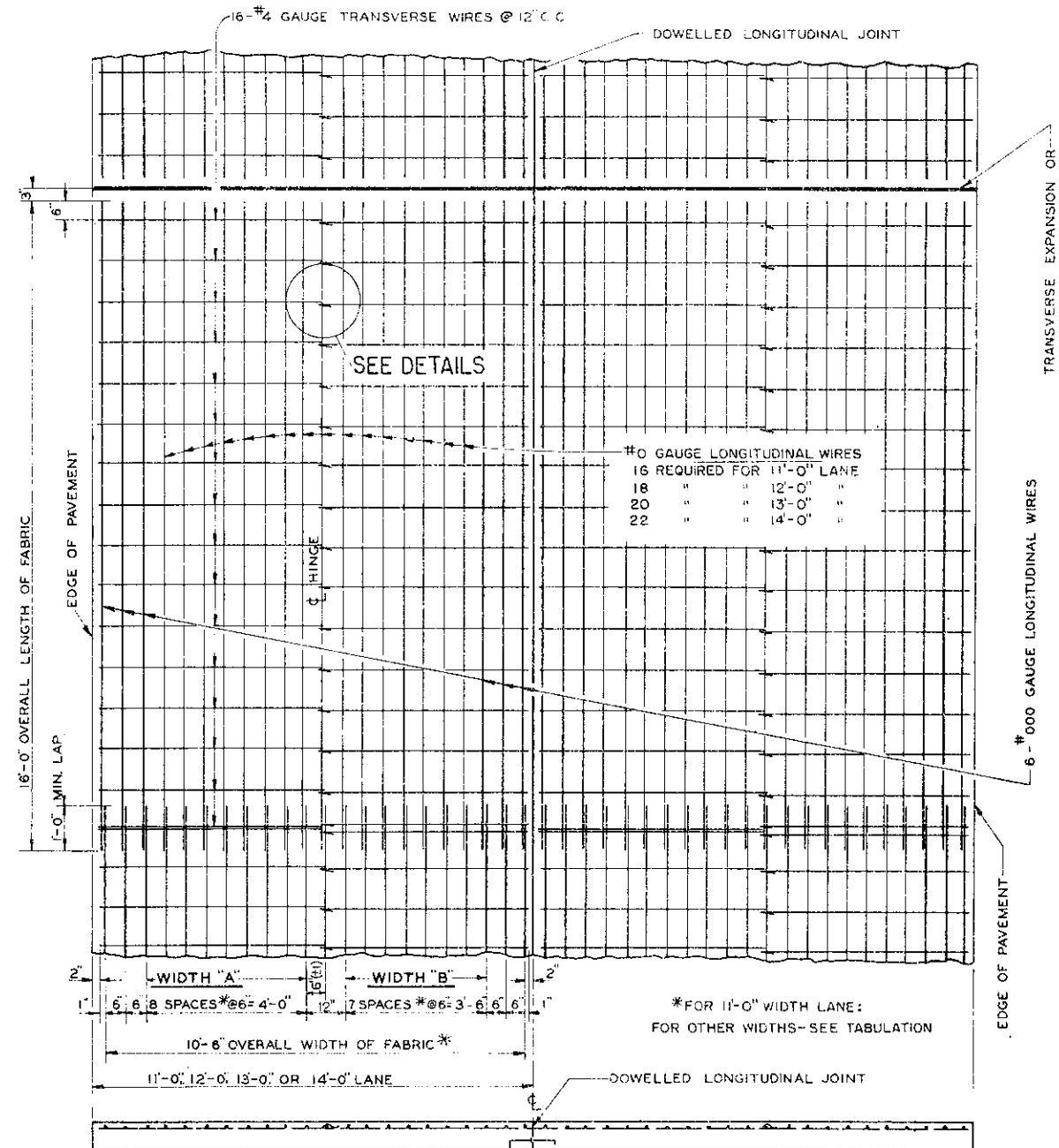
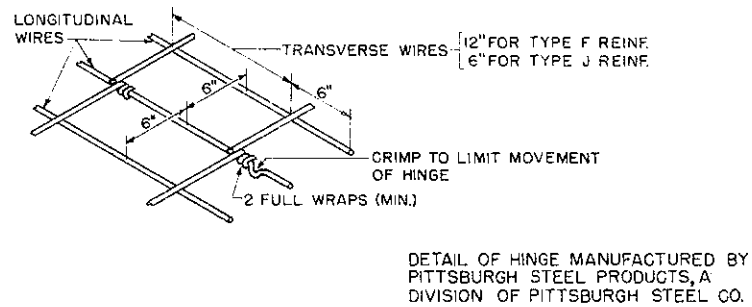
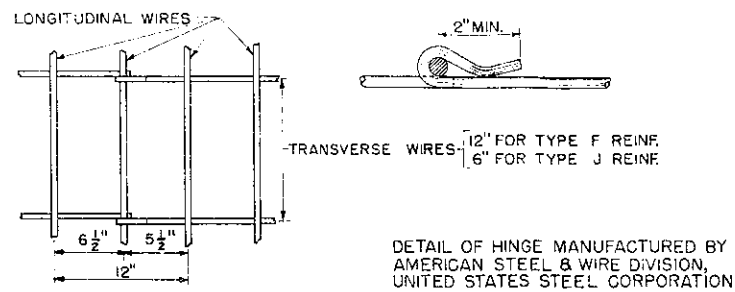
HINGED TYPE J REINFORCEMENT IS TO BE USED FOR 14'-0", 15'-0", 16'-0", 17'-0", AND 18'-0" WIDTH PAVEMENT LANES WHERE LONGITUDINAL JOINTS ARE NOT PERMITTED.

STEEL WIRE FABRIC SHALL CONFORM TO THE DEPARTMENT'S SPECIFICATIONS, FORM 408, AND SHALL CONSIST OF HINGED SHEETS OF MEMBERS RIGIDLY ATTACHED AT POINTS OF INTERSECTION.

THE GAUGE, NUMBER, AND SPACING OF THE LONGITUDINAL AND TRANSVERSE WIRES FOR VARIOUS WIDTHS OF PAVING LANES SHALL BE AS SHOWN ABOVE.

THE MINIMUM LAP OF REINFORCEMENT SHALL BE 1'-0" FROM END TO END OF WIRES MEASURED ALONG THE LINE OF LAP OF THE WIRES AS SHOWN.

THE LOCATION OF THE HINGE WITH RESPECT TO THE WIDTH OF THE LANE MAY BE VARIED FROM THE LOCATION SHOWN, WITH ACCOMPANYING CHANGES IN DIMENSIONS "A" AND "B".



\*FOR 11'-0" WIDTH LANE: FOR OTHER WIDTHS--SEE TABULATION

**TYPE F REINFORCEMENT-FABRIC, HINGED**

WHERE LANES WIDER THAN 11'-0" ARE USED, THE FOLLOWING DIMENSIONS APPLY

| LANE WIDTH | WIDTH A              | WIDTH B              | OVERALL WIDTH OF FABRIC |
|------------|----------------------|----------------------|-------------------------|
| 12'-0"     | 9 SPACES @ 6"= 4'-6" | 8 SPACES @ 6"= 4'-0" | 11'-6"                  |
| 13'-0"     | 10 " @ 6"= 5'-0"     | 9 " @ 6"= 4'-6"      | 12'-6"                  |
| 14'-0"     | 11 " @ 6"= 5'-6"     | 10 " @ 6"= 5'-0"     | 13'-6"                  |

HINGED TYPE F REINFORCEMENT IS TO BE USED FOR 11'-0", 12'-0", 13'-0", AND 14'-0" WIDTH PAVEMENT LANES WHERE DOWELLED LONGITUDINAL JOINTS ARE NOT PERMITTED.

STEEL WIRE FABRIC SHALL CONFORM TO THE DEPARTMENT'S SPECIFICATIONS, FORM 408, AND SHALL CONSIST OF HINGED SHEETS OF MEMBERS RIGIDLY ATTACHED AT POINTS OF INTERSECTION.

THE GAUGE, NUMBER, AND SPACING OF THE LONGITUDINAL AND TRANSVERSE WIRES FOR THE VARIOUS WIDTHS OF PAVING LANES SHALL BE AS SHOWN ABOVE.

THE MINIMUM LAP OF REINFORCEMENT SHALL BE 1'-0" FROM END TO END OF WIRES MEASURED ALONG THE LINE OF LAP OF THE WIRES AS SHOWN.

THE LOCATION OF THE HINGE WITH RESPECT TO THE WIDTH OF THE LANE MAY BE VARIED FROM THE LOCATION SHOWN, WITH ACCOMPANYING CHANGES IN DIMENSIONS "A" AND "B".

**STANDARD TYPES OF REINFORCEMENT**

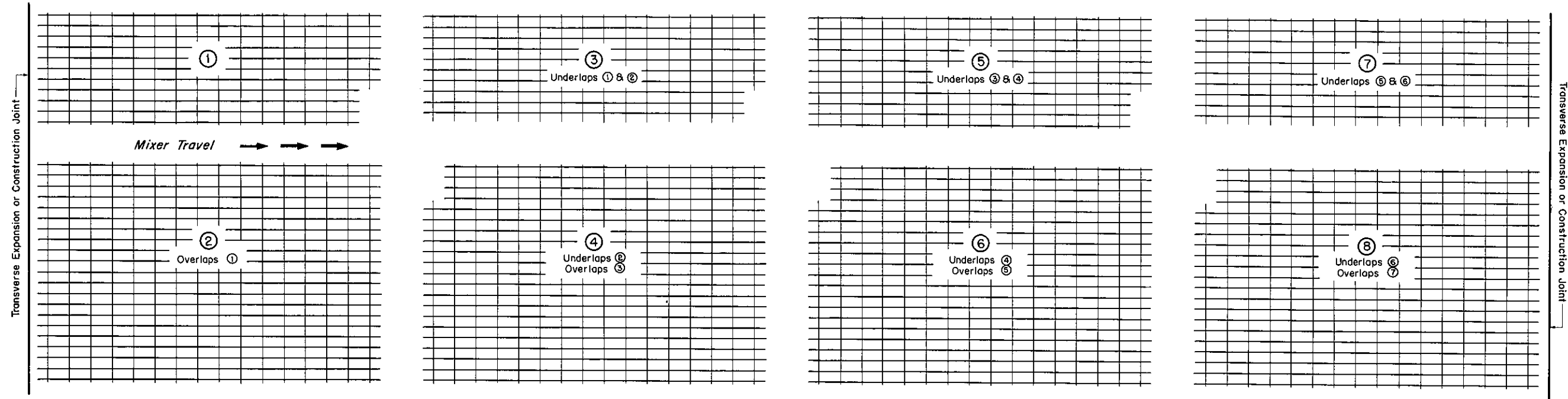
SHEET 5 OF 5

**NOTES**

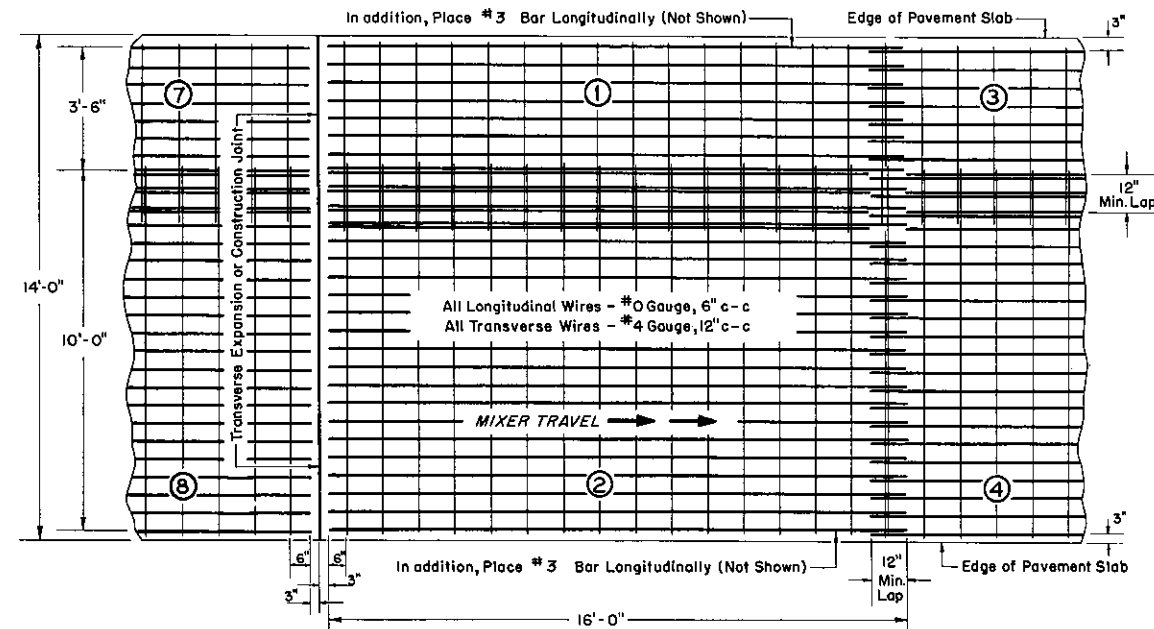
Pavement reinforcement shall be placed 3"(±1/2)" clear, below pavement surface.

Adm. 29, 1970  
 - March 1968  
 February 5, 1968  
 April 2, 1968

**B-2**



RECOMMENDED METHOD OF CUTTING AND PLACING REINFORCEMENT FOR ONE PAVEMENT SLAB



DETAILS OF REINFORCEMENT AND METHOD OF LAPPING

Reinforcement shall be 10'-0" wide, outside to outside of longitudinal wires, plus 1" overhang on each side.

Reinforcement shall be 6" x 12", #0 and #4 Gauge wires in sheets 10' wide by 16' long.

A #3 reinforcement bar shall be placed along each longitudinal edge.

The minimum laps of reinforcement shall be twelve (12) inches from end to end of the wires measured along the line of the lap, both longitudinally and transversely.

This method of cutting and placing reinforcement may also be used for slabs more than fourteen (14) feet in width where no longitudinal joint is specified.

NOT TO BE USED ON ANY PROJECT WITHOUT SPECIFIC APPROVAL

Revised for Bar Designation.  
APPROVED *November 6, 1961*

*[Signature]*  
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
**EMERGENCY REINFORCEMENT**  
FOR 14-FOOT WIDTH PAVEMENT SLAB

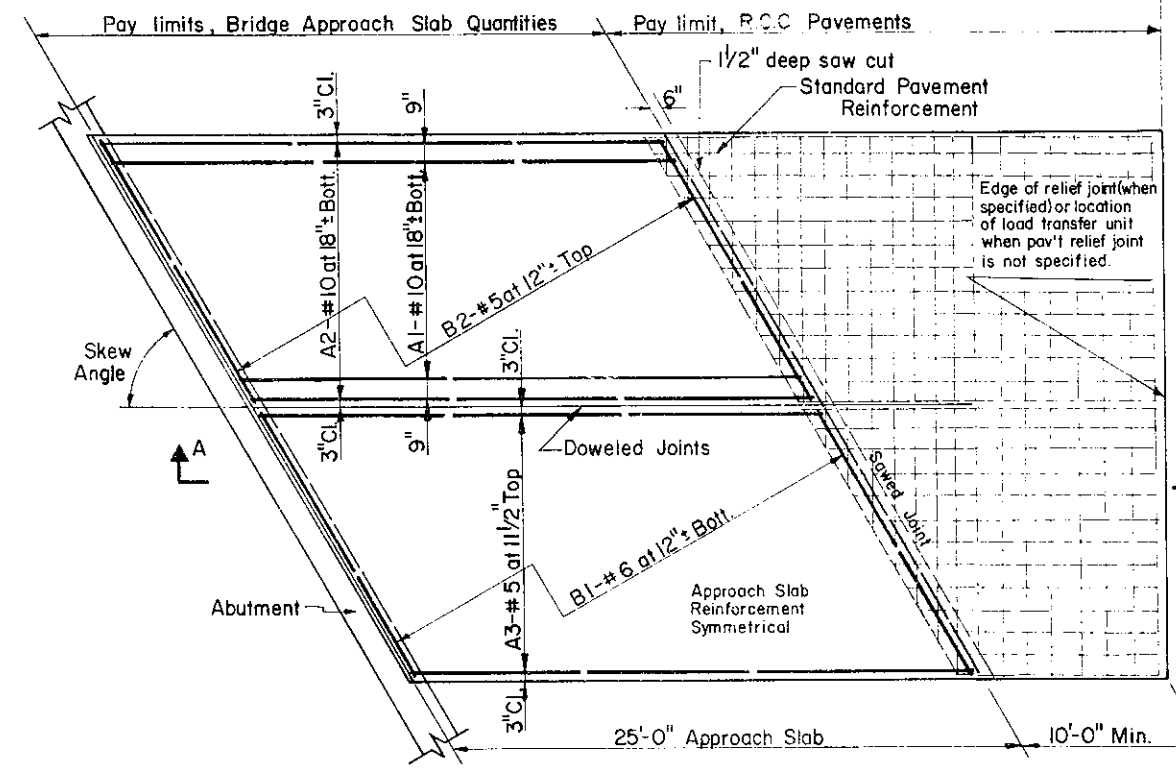
APPROVED *Nov. 15, 1951*

*[Signature]*  
CHIEF ENGINEER

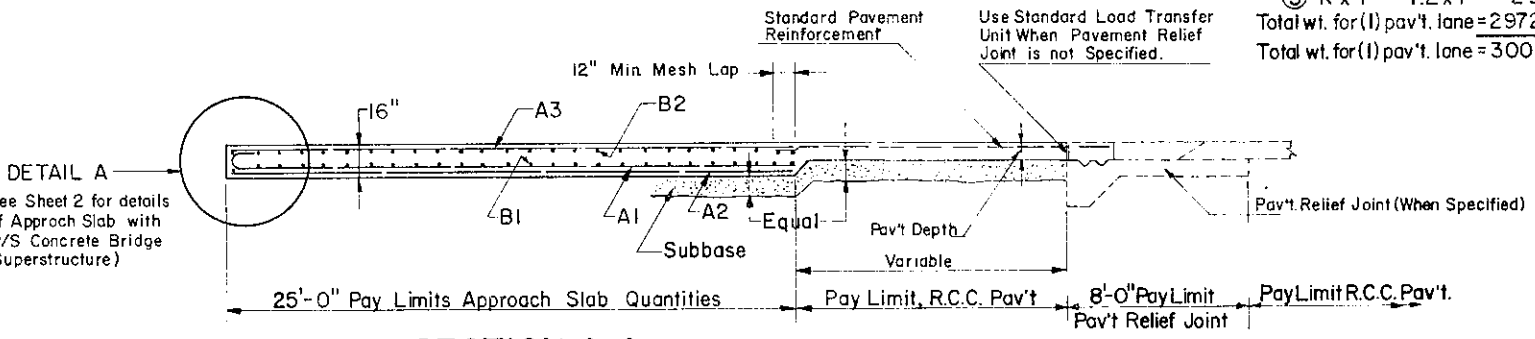
**B-2  
SPECIAL**

### TRANSVERSE BARS & QUANTITIES FOR ONE PAVEMENT LANE

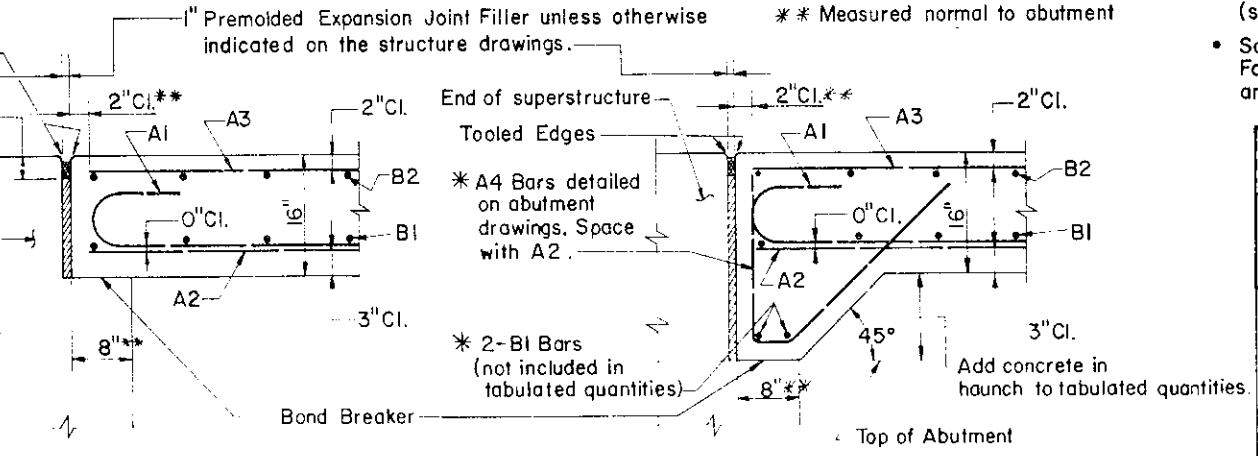
| SKEW ANGLE   | LANE WIDTH (W) | TRANSVERSE BARS |         |           |         | QUANTITIES |     |      |                  |                          |     |     |       |
|--------------|----------------|-----------------|---------|-----------|---------|------------|-----|------|------------------|--------------------------|-----|-----|-------|
|              |                | B1, BOTT.#6     |         | B2, TOP#5 |         | K          | d°  | d'   | CL. AA CONC. CY. | REINFORCEMENT BARS, LBS. |     |     | TOTAL |
|              |                | NO.             | LENGTH  | NO.       | LENGTH  |            |     |      |                  | A1-A2-A3                 | B1  | B2  |       |
| 90° Thru 80° | 11'            | 26              | 10'-9"  | 26        | 10'-8"  | 5.5        | 0.7 | 0.00 | 13.5             | 1951                     | 416 | 289 | 2656  |
|              | 12'            | 26              | 11'-9"  | 26        | 11'-8"  |            | 0.8 | 0.00 | 14.8             | 2196                     | 456 | 317 | 2969  |
|              | 13'            | 26              | 12'-9"  | 26        | 12'-8"  |            | 0.9 | 0.00 | 16.0             | 2442                     | 494 | 343 | 3279  |
|              | 14'            | 26              | 13'-9"  | 26        | 13'-8"  |            | 0.9 | 0.00 | 17.2             | 2468                     | 533 | 370 | 3371  |
| 70°          | 11'            | 25              | 11'-4"  | 25        | 11'-4"  | 5.3        | 1.0 | 0.00 | 13.5             | 1951                     | 425 | 296 | 2672  |
|              | 12'            | 25              | 12'-5"  | 25        | 12'-5"  |            | 1.0 | 0.00 | 14.8             | 2196                     | 467 | 324 | 2987  |
|              | 13'            | 25              | 13'-6"  | 25        | 13'-6"  |            | 1.2 | 0.00 | 16.0             | 2442                     | 508 | 353 | 3303  |
|              | 14'            | 25              | 14'-6"  | 25        | 14'-6"  |            | 1.4 | 0.00 | 17.2             | 2468                     | 545 | 379 | 3392  |
| 65°          | 11'            | 24              | 11'-9"  | 24        | 11'-9"  | 5.1        | 1.4 | 0.02 | 13.5             | 1951                     | 424 | 293 | 2668  |
|              | 12'            | 24              | 12'-10" | 24        | 12'-10" |            | 1.6 | 0.03 | 14.8             | 2196                     | 463 | 320 | 2979  |
|              | 13'            | 24              | 14'-0"  | 24        | 14'-0"  |            | 1.6 | 0.03 | 16.0             | 2442                     | 505 | 350 | 3297  |
|              | 14'            | 24              | 15'-1"  | 24        | 15'-1"  |            | 1.6 | 0.03 | 17.2             | 2468                     | 544 | 377 | 3389  |
| 60°          | 11'            | 23              | 12'-4"  | 23        | 12'-4"  | 4.9        | 1.6 | 0.03 | 13.5             | 1951                     | 427 | 296 | 2674  |
|              | 12'            | 23              | 13'-6"  | 23        | 13'-6"  |            | 1.8 | 0.03 | 14.8             | 2196                     | 467 | 324 | 2987  |
|              | 13'            | 23              | 14'-8"  | 23        | 14'-8"  |            | 2.0 | 0.03 | 16.0             | 2442                     | 508 | 353 | 3303  |
|              | 14'            | 23              | 15'-9"  | 23        | 15'-9"  |            | 2.2 | 0.04 | 17.2             | 2468                     | 544 | 378 | 3390  |
| 55°          | 11'            | 22              | 13'-0"  | 22        | 13'-0"  | 4.7        | 2.2 | 0.04 | 13.5             | 1951                     | 430 | 298 | 2679  |
|              | 12'            | 22              | 14'-3"  | 22        | 14'-3"  |            | 2.4 | 0.04 | 14.8             | 2196                     | 472 | 328 | 2996  |
|              | 13'            | 22              | 15'-6"  | 22        | 15'-6"  |            | 2.4 | 0.04 | 16.0             | 2442                     | 512 | 357 | 3311  |
|              | 14'            | 22              | 16'-8"  | 22        | 16'-8"  |            | 2.8 | 0.05 | 17.2             | 2468                     | 551 | 383 | 3402  |
| 50°          | 11'            | 20              | 13'-11" | 20        | 13'-11" | 4.2        | 2.8 | 0.05 | 13.5             | 1951                     | 419 | 291 | 2661  |
|              | 12'            | 20              | 15'-3"  | 20        | 15'-3"  |            | 3.0 | 0.05 | 14.8             | 2196                     | 458 | 318 | 2972  |
|              | 13'            | 20              | 16'-6"  | 20        | 16'-6"  |            | 3.4 | 0.06 | 16.0             | 2442                     | 496 | 344 | 3282  |
|              | 14'            | 20              | 17'-10" | 20        | 17'-10" |            | 3.6 | 0.06 | 17.2             | 2468                     | 536 | 372 | 3376  |
| 45°          | 11'            | 19              | 15'-1"  | 19        | 15'-1"  | 4.0        | 3.6 | 0.06 | 13.5             | 1951                     | 430 | 299 | 2680  |
|              | 12'            | 19              | 16'-6"  | 19        | 16'-6"  |            | 4.0 | 0.07 | 14.8             | 2196                     | 472 | 328 | 2996  |
|              | 13'            | 19              | 17'-11" | 19        | 17'-11" |            | 4.2 | 0.07 | 16.0             | 2442                     | 512 | 356 | 3310  |
|              | 14'            | 19              | 19'-4"  | 19        | 19'-4"  |            | 4.6 | 0.07 | 17.2             | 2468                     | 551 | 383 | 3402  |
| 40°          | 11'            | 17              | 16'-7"  | 17        | 16'-7"  | 3.6        | 4.8 | 0.08 | 13.5             | 1951                     | 424 | 294 | 2669  |
|              | 12'            | 17              | 18'-2"  | 17        | 18'-2"  |            | 5.2 | 0.09 | 14.8             | 2196                     | 464 | 322 | 2982  |
|              | 13'            | 17              | 19'-8"  | 17        | 19'-8"  |            | 5.8 | 0.09 | 16.0             | 2442                     | 502 | 348 | 3292  |
|              | 14'            | 17              | 21'-3"  | 17        | 21'-3"  |            | 6.2 | 0.10 | 17.2             | 2468                     | 544 | 378 | 3390  |
| 35°          | 11'            | 15              | 18'-7"  | 15        | 18'-7"  | 3.2        | 6.6 | 0.11 | 13.5             | 1951                     | 419 | 291 | 2661  |
|              | 12'            | 15              | 20'-4"  | 15        | 20'-4"  |            | 7.2 | 0.12 | 14.8             | 2196                     | 458 | 318 | 2972  |
|              | 13'            | 15              | 22'-1"  | 15        | 22'-1"  |            | 7.8 | 0.13 | 16.0             | 2442                     | 497 | 345 | 3284  |
|              | 14'            | 15              | 23'-10" | 15        | 23'-10" |            | 8.4 | 0.14 | 17.2             | 2468                     | 538 | 373 | 3379  |
| 30°          | 11'            | 14              | 21'-4"  | 14        | 21'-4"  | -          | -   | -    | 13.5             | 1951                     | 449 | 312 | 2712  |
|              | 12'            | 14              | 23'-4"  | 14        | 23'-4"  |            | -   | -    | 14.8             | 2196                     | 490 | 340 | 3026  |
|              | 13'            | 14              | 25'-4"  | 14        | 25'-4"  |            | -   | -    | 16.0             | 2442                     | 532 | 369 | 3343  |
|              | 14'            | 14              | 27'-4"  | 14        | 27'-4"  |            | -   | -    | 17.2             | 2468                     | 574 | 398 | 3440  |



PLAN



SECTION A-A



DETAIL A

DETAIL A (ALTERNATE)

### NOTES

- Material, workmanship and method of payment shall be in accordance with Section 666 of Form 408.
- Approach slabs shall be constructed in accordance with this Standard Drawing unless otherwise modified or shown on the structure drawings.
- Approach slab quantities are shown on the structure drawings.
- For skew angles less than 30°, transverse bars B1 & B2 shall be as detailed on the abutment drawings and spaced in accordance with this Standard Drawing.
- For skew angles not tabulated, the number of transverse bars B1 & B2 tabulated for the next larger skew angle shall be used.
- For skew angles not tabulated, the lengths of transverse bars B1 & B2, and the total weight of reinforcement bars for one pavement lane, shall be determined by using values tabulated for the next larger skew angle, as shown by the following example:  
 Given: (From structure drawings)  
 Skew angle = 47°-38'-45" use 47°-39'  
 Pavement width = 12'-0"  
 ① From table, for next larger skew angle = 50° : d°=3.0, d'=0.05, K=4.2  
 ② (50°) - (47°-39') = 2°-21'  
 2° x d° = 2 x 3.0 = 6.0  
 21' x d' = 21 x 0.05 = 1.05  
 Length of B1 & B2 = 15'-3" for Δ = 50°  
 Length of B1 & B2 = 15'-10" for Δ = 47°-38'-45"  
 ③ K x 7" = 4.2 x 7" = 29 lbs.  
 Total wt. for (1) pav't. lane = 2972 lbs. for Δ = 50°  
 Total wt. for (1) pav't. lane = 3001 lbs. for Δ = 47°-38'-45"

### LONGITUDINAL BARS FOR ONE PAVEMENT LANE

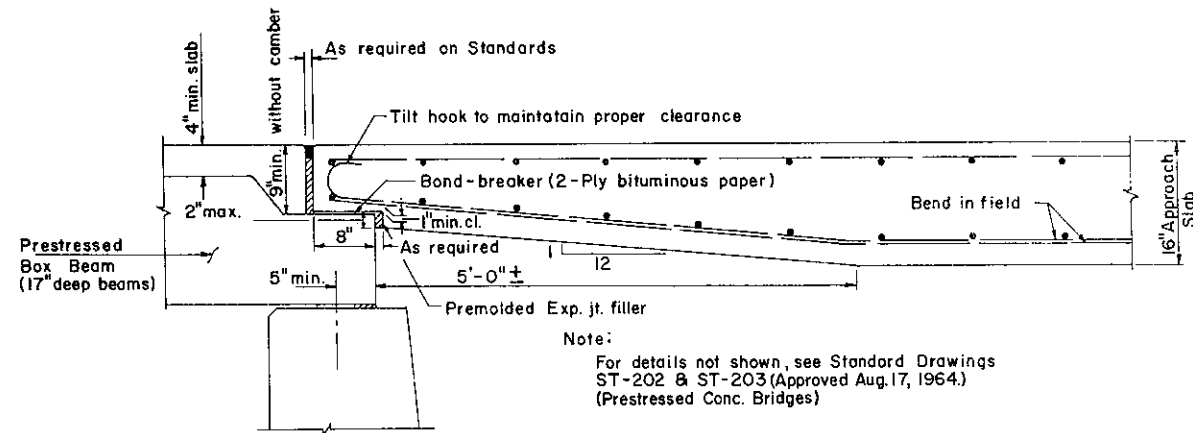
| LANE WIDTH | A1, #10 BOTT. |        | A2, #10 BOTT. |        | A3, #5 TOP |        |
|------------|---------------|--------|---------------|--------|------------|--------|
|            | NO.           | LENGTH | NO.           | LENGTH | NO.        | LENGTH |
| 11'        | 7             | 26'-4" | 8             | 24'-8" | 12         | 24'-8" |
| 12'        | 8             | 26'-4" | 9             | 24'-8" | 13         | 24'-8" |
| 13'        | 9             | 26'-4" | 10            | 24'-8" | 14         | 24'-8" |
| 14'        | 9             | 26'-4" | 10            | 24'-8" | 15         | 24'-8" |

### BAR DETAILS

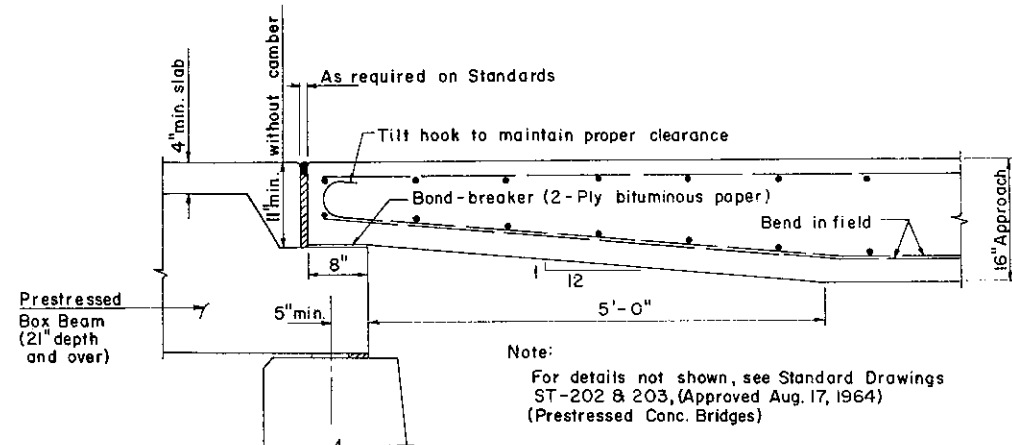
- 24'-8" A1, #10 x 26'-4" Bottom, Longitudinal
- 24'-8" A2, #10 Bottom, Longitudinal
- 24'-8" A3, #5 Top, Longitudinal
- See Table B1, #6 Bottom, Transverse
- See Table B2, #5 Top, Transverse

Des. S.R.S.  
Trc. W.A.T.  
Ckd. L.C.

Revised to add Sheet 2  
 APPROVED Jan 6, 1969 CHIEF ENGINEER *M. Mankate*  
 Revised to show, 10 foot min. R.C.C. pavement and Pavement Relief Joint.  
 APPROVED APRIL 2, 1968 *T. Truckart* CHIEF ENGINEER  
 COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 BRIDGE APPROACH SLAB  
 APPROVED February 5, 1968 *M. Mankate* CHIEF ENGINEER  
 SHEET 1 OF 2  
 B-3



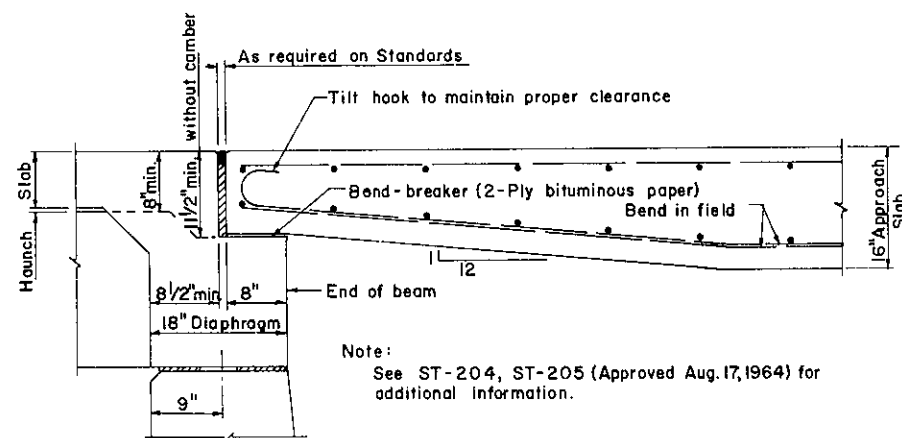
17" DEEP ADJACENT COMPOSITE BOX BEAMS WITH 9" DEEP APPROACH SLAB NOTCH



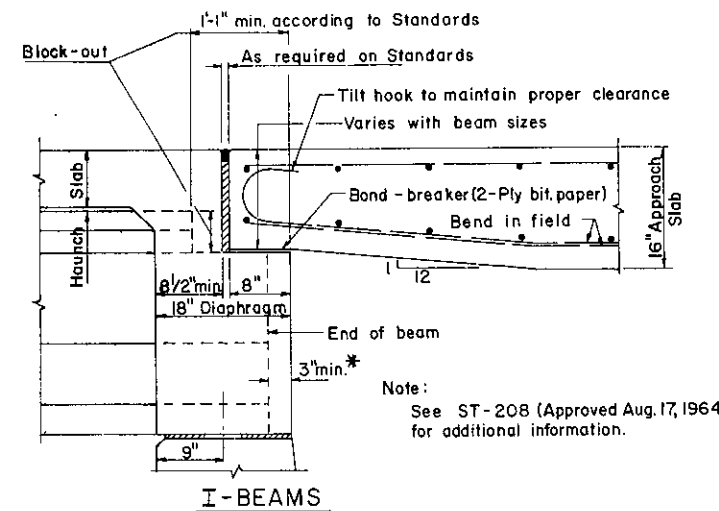
21" TO 48" DEEP ADJACENT COMPOSITE BOX BEAMS WITH 11" DEEP APPROACH SLAB NOTCH

Notes for Construction Revisions

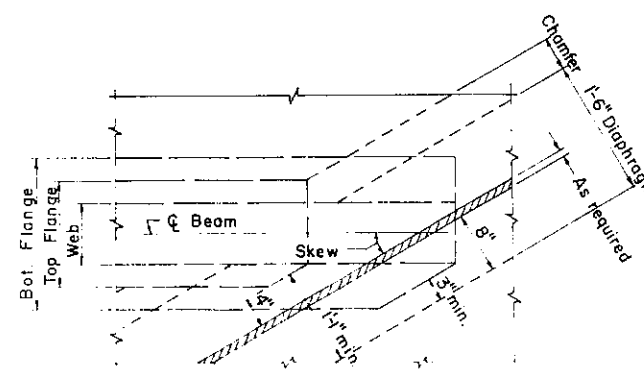
- When making construction changes in the field this drawing is to serve as a guide for modifying notch details shown on P/S Standard Drawings (ST-200 Series, Approved Aug. 17, 1964) for accommodating the Standard 16" Approach Pavement Slab.
- At beam ends, burn off reinforcement protruding into approach slab notch.
- \* Increase in field, providing overhang, if required.
- Adjust concrete quantities shown in tables on Sheet 1 when approach slab is tapered.



SPREAD BOX BEAMS WITH APPROACH SLAB NOTCH 1 1/2" OR DEEPER



I-BEAMS



PLAN - I-BEAMS

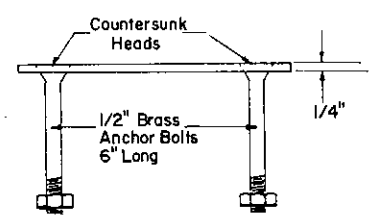
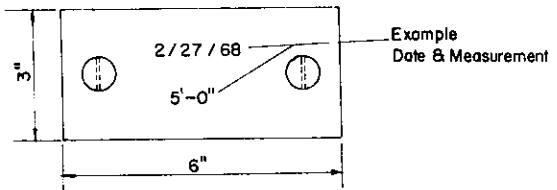
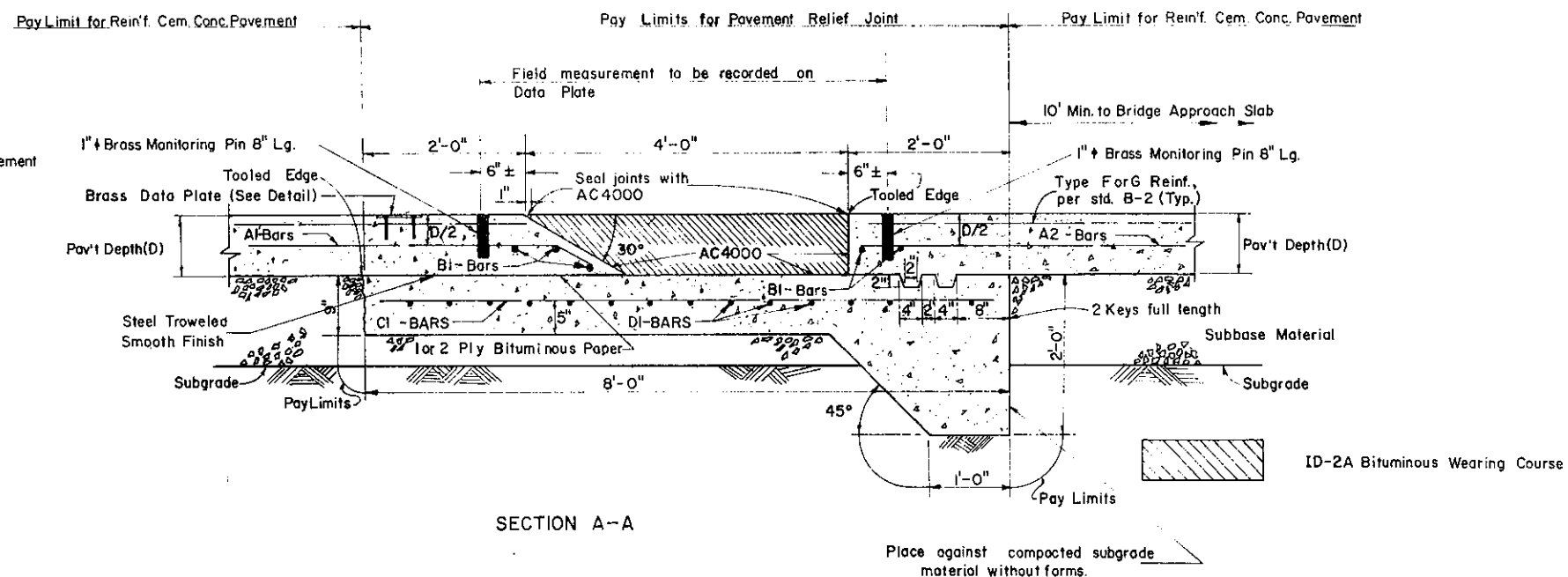
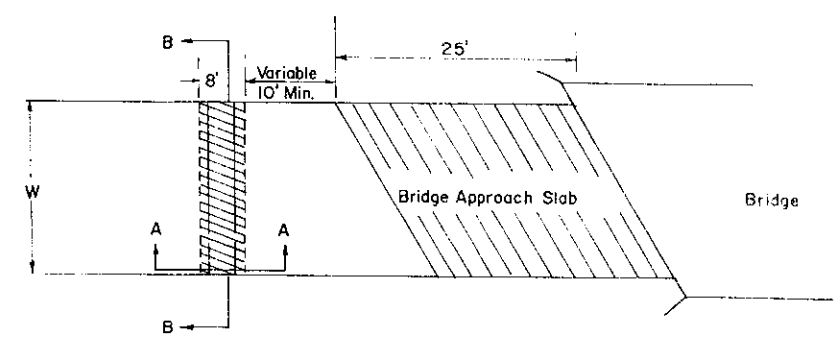
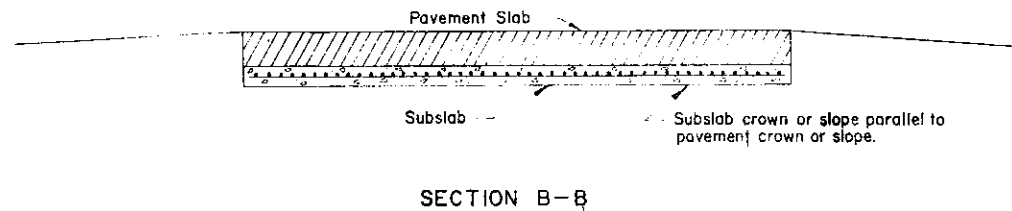
SCALE 1" = 1'-0"

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
BRIDGE APPROACH SLAB

1/6/69

SHEET 2 OF 2

B-3



- NOTES:**
1. Numerals shall be legibly stamped into brass plate.
  2. Brass plate shall be placed 6" from edge of pavement.
  3. Slotted bolt heads optional.

**NOTES**

Material, workmanship and method of payment shall be in accordance with Section 665 of Form 408.  
 Concrete in subslab to be Class AA (or contractors option subslab concrete may be H.E.S.)  
 Portions of A1-Bars and A2-Bars which are outside of the indicated pay lines are to be included in price bid for complete joint.  
 Bituminous Surface Course to be placed in lifts not to exceed 5" compacted depth.  
 When the relief joint is located at or near the low point of a sag vertical curve, pipe foundation under drain Type A with Type II backfill will be used for transverse drainage under the subslab on the roadway side and will be measured and paid for as specified in Section 610.  
 When plain cement concrete base course is specified the pavement relief joint shall be shown on the construction drawings as a special design.  
 The monitoring pins & brass data plate shall be considered as part of the pavement relief joint construction & no separate payment will be made.  
 The brass monitoring pins shall be center marked with a punch and the field measurement taken (to nearest 1/2") between punch marks.

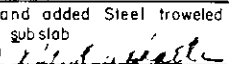
| SCHEDULE OF REINFORCING STEEL |      |             |            |           |                                     |
|-------------------------------|------|-------------|------------|-----------|-------------------------------------|
| MARK                          | SIZE | SPACING C-C | LENGTH     | NO. REQ'D | WEIGHT /FT. TRANSVERSE MEASURE LBS. |
| A1                            | 5    | 12"         | 4'-0"      | (W)       | 4.172                               |
| A2                            | 5    | 12"         | 3'-0"      | (W)       | 3.129                               |
| B1                            | 5    | 6"          | W minus 4" | 5         | 5.215                               |
| C1                            | 4    | 6"          | 7'-8"      | (W)(2)    | 10.240                              |
| D1                            | 4    | 6"          | W minus 4" | 16        | 10.688                              |

3'-6"   
 1'-0"   
 30°   
 6"

A1 Bars


| APPROXIMATE QUANTITIES PER FOOT OF TRANSVERSE MEASURE |                          |       |       |
|---|--------------------------|-------|-------|
|   | MAIN LINE PAVEMENT DEPTH |       |       |
|   | 8"                       | 9"    | 10"   |
| Cu Yds Class AA Conc                                  | .30                      | .30   | .30   |
| Lbs Reinforcing Steel                                 | 33.44                    | 33.44 | 33.44 |
| Tons ID-2A Bit Wearing Crse *                         | .17                      | .19   | .20   |
| Sq. Yds. R.C.C. Pave **                               | 51                       | 52    | 53    |

\* Calculated using 145#/ft<sup>3</sup>  
 \*\* Beveled portion of pavement slab has been converted to equivalent design depth of main line pavement.

Revised data plate and added Steel troweled smooth finish note to subslab  
 Approved Jan. 6, 1969  
  
 Chief Engineer

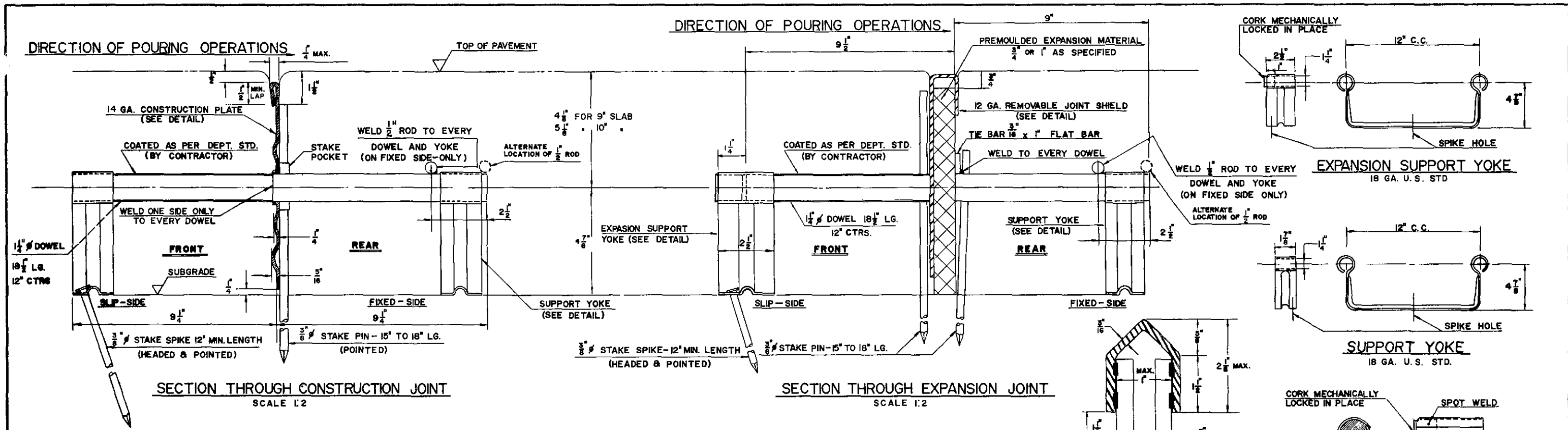
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS

PAVEMENT RELIEF JOINT

Approved April 2, 1968  
  
 CHIEF ENGINEER

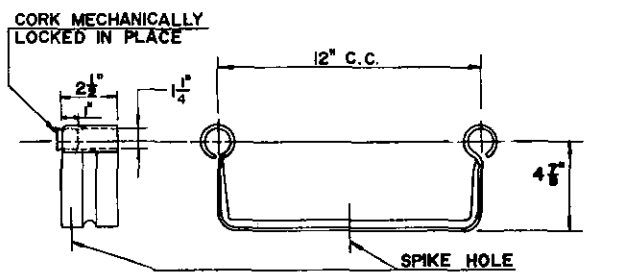
B-4



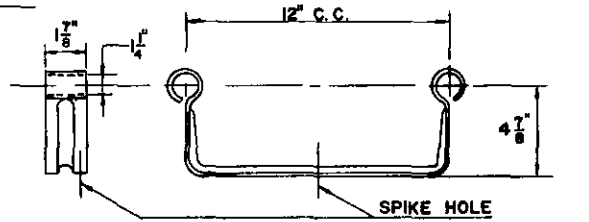


SECTION THROUGH CONSTRUCTION JOINT  
SCALE 1:2

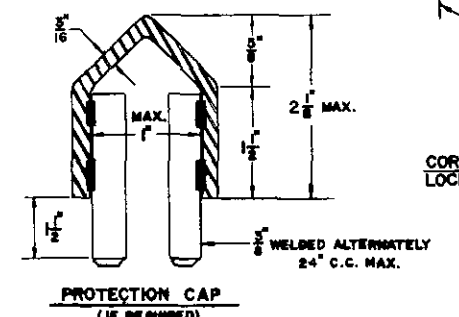
SECTION THROUGH EXPANSION JOINT  
SCALE 1:2



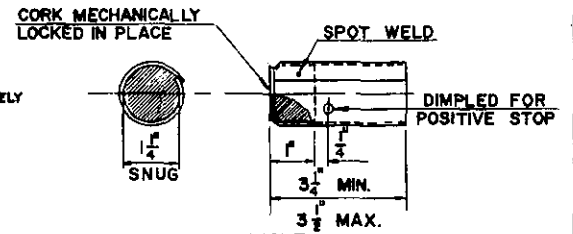
EXPANSION SUPPORT YOKE  
18 GA. U.S. STD



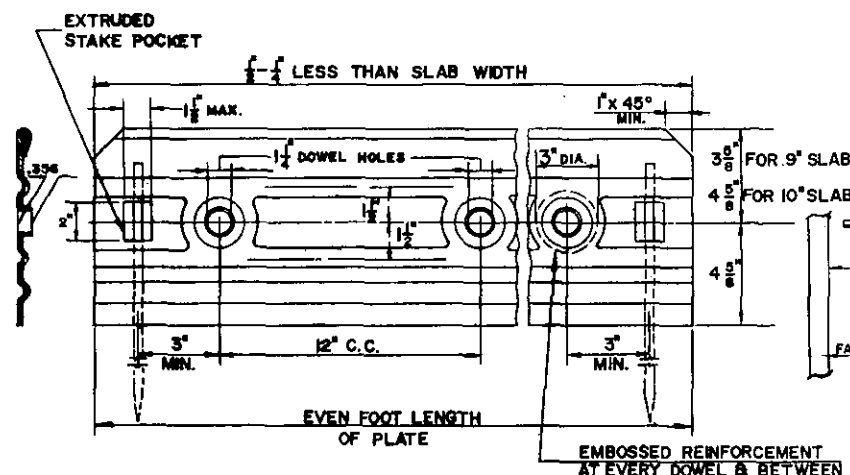
SUPPORT YOKE  
18 GA. U.S. STD.



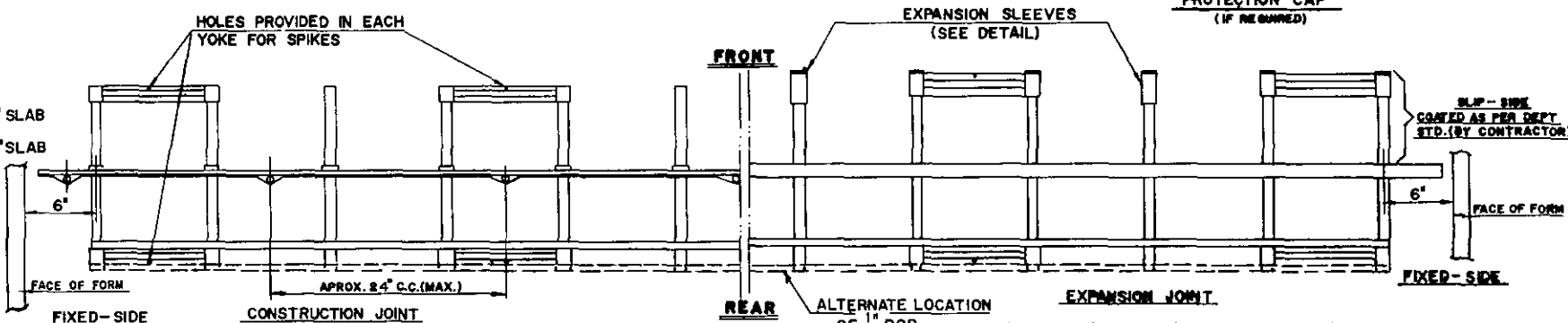
PROTECTION CAP  
(IF REQUIRED)



SINGLE METAL EXPANSION SLEEVE  
26 GA. U.S. STD.



CONSTRUCTION PLATE  
(FOR EVEN AND ODD FOOT LENGTHS)  
14 GA. U.S. STD

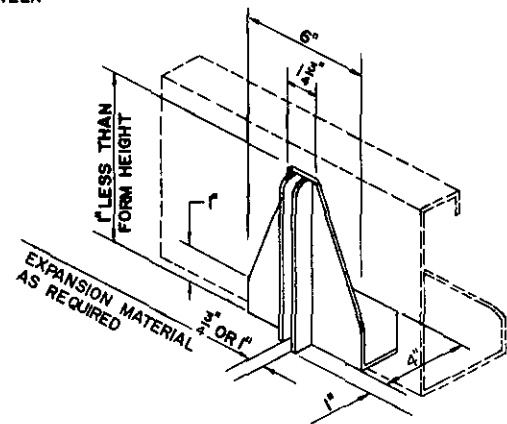


TYPICAL 12 FT. LOAD TRANSFER ASSEMBLIES

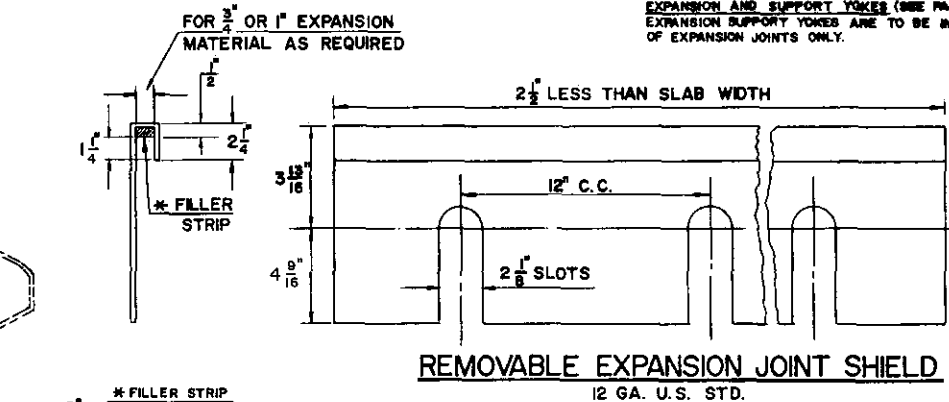
MINIMUM PARTS SCHEDULE FOR VARIOUS JOINT LENGTHS

| JOINT LENGTH | STAKE PINS |           | SINGLE SLEEVES |          | SUPPORT YOKES |      |
|--------------|------------|-----------|----------------|----------|---------------|------|
|              | STAKE PINS | EXPR. JT. | COL. JT.       | EXP. JT. | FRONT         | REAR |
| 4 FT         | 2          | 3         | 3              | 0        | 2             | 2    |
| 5            | 2          | 3         | 3              | 1        | 2             | 2    |
| 6            | 2          | 3         | 4              | 2        | 2             | 2    |
| 7            | 3          | 4         | 4              | 1        | 3             | 3    |
| 8            | 3          | 4         | 5              | 2        | 3             | 3    |
| 9            | 3          | 5         | 5              | 3        | 3             | 3    |
| 10           | 3          | 5         | 6              | 4        | 3             | 3    |
| 11           | 4          | 6         | 6              | 3        | 4             | 4    |
| 12           | 4          | 6         | 7              | 4        | 4             | 4    |
| 13           | 4          | 7         | 7              | 5        | 4             | 4    |
| 14           | 4          | 7         | 8              | 6        | 4             | 4    |
| 15           | 5          | 8         | 8              | 5        | 5             | 5    |
| 16           | 5          | 8         | 9              | 6        | 5             | 5    |

NUMBER AND LENGTH OF SPIKES AND PINS SHALL BE INCREASED IF REQUIRED DUE TO SUBGRADE CONDITIONS.



EXPANSION END GUIDE  
AS PER STD B-1



REMOVABLE EXPANSION JOINT SHIELD  
12 GA. U.S. STD.

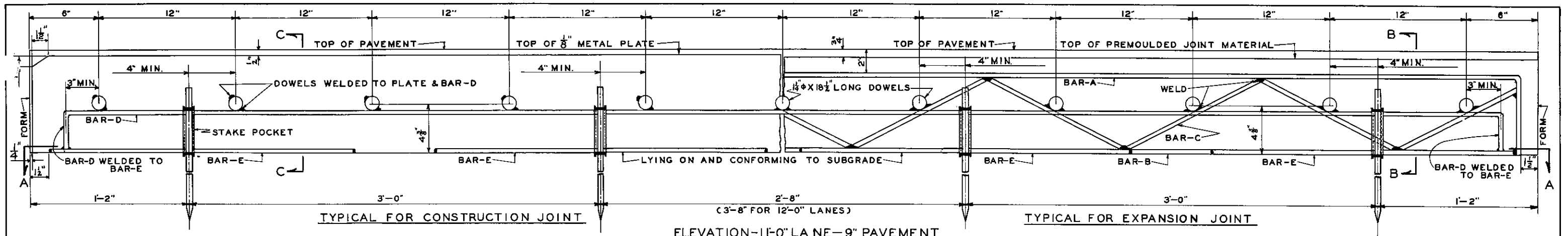
\* FILLER STRIP  
EITHER 3/8\"/>

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
ASSEMBLY DETAILS  
LOAD TRANSFER UNITS  
IN ACCORDANCE WITH DEPARTMENT STANDARD B-1  
APPROVED *September 10, 1964*  
*Matthews*  
CHIEF ENGINEER

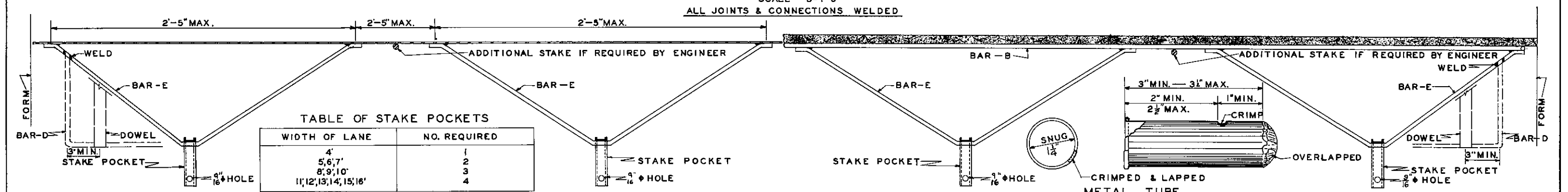
TYPE-C

M'F'D BY:  
BEHRINGER METAL WORKS INC., NEWARK 5, N. J.  
BMW-5

LSN-9/16/64  
10/10/64 414/64



ELEVATION-11'-0" LANE-9" PAVEMENT  
SCALE-3"=1'-0"



SECTION-AA  
SCALE-3"=1'-0"

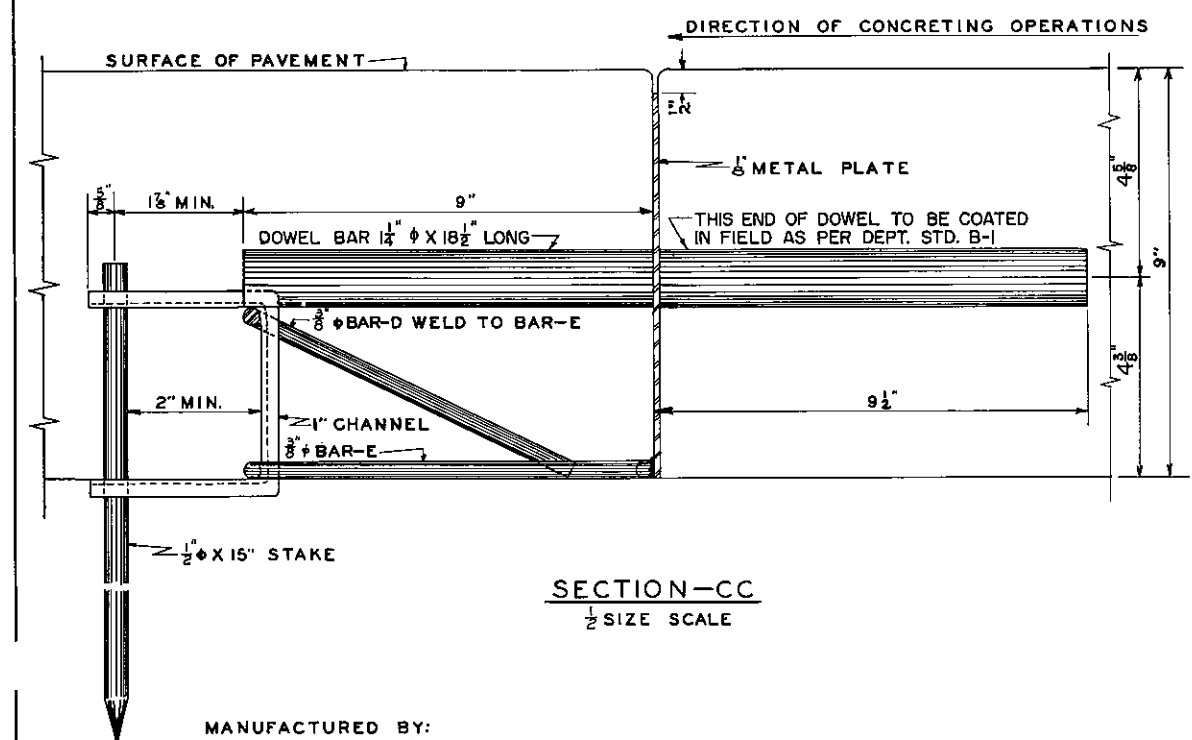
**NOTES**

THE LOAD TRANSFER UNIT SHOWN IS FOR A 11'-0" LANE OF 9" UNIFORM DEPTH. FOR NARROWER OR WIDER LANES THE NUMBER OF DOWELS IS DECREASED OR INCREASED ACCORDINGLY. THE END DETAILS REMAIN AS SHOWN AND 12" SPACING OF DOWELS MAINTAINED. FOR NUMBER OF STAKE POCKETS REQUIRED FOR VARIOUS PAVEMENT WIDTHS - SEE TABLE.

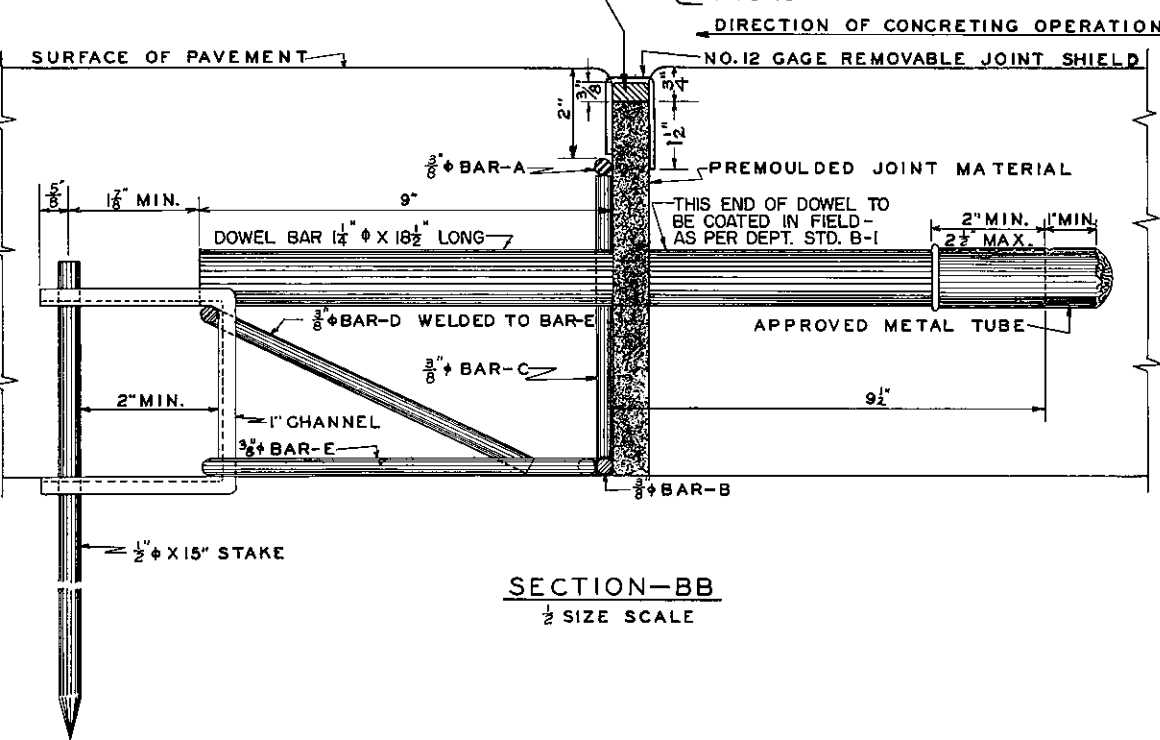
THE CENTER OF DOWELS SHALL BE LOCATED VERTICALLY 1/8" BELOW THE CENTER OF THE SLAB. FOR 8" AND 10" DEPTHS OF PAVING THE DISTANCE FROM SUBGRADE TO CENTER LINE OF DOWELS SHOWN AS 4 3/8" FOR 9" PAVING BECOMES 3 7/8" AND 4 7/8" RESPECTIVELY FOR 8" & 10" PAVING

STANDARD END GUIDES AS SHOWN ON STANDARD B-1 OF DEPARTMENT OF HIGHWAYS SHALL BE USED AT ALL TRANSVERSE EXPANSION JOINTS.

UNDER NORMAL CONDITIONS PROVIDE 15" STAKES FOR STAKE POCKETS SHOWN. ADDITIONAL STAKES TO BE FURNISHED AND PLACED AS MAY BE DIRECTED BY THE ENGINEER WHERE POOR SUBSOIL CONDITIONS ARE ENCOUNTERED DURING CONSTRUCTION. THE LENGTH OF STAKES MAY BE INCREASED OR DECREASED DEPENDING ON SUBGRADE CONDITIONS.



SECTION-CC  
1/2 SIZE SCALE

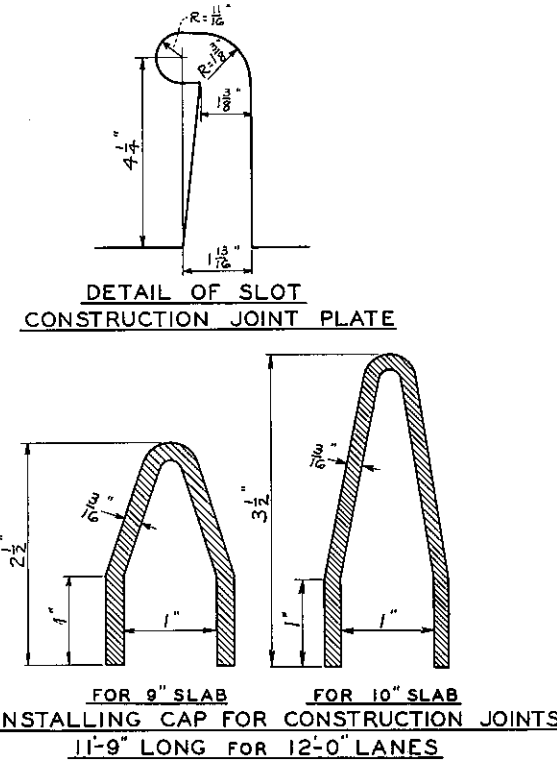
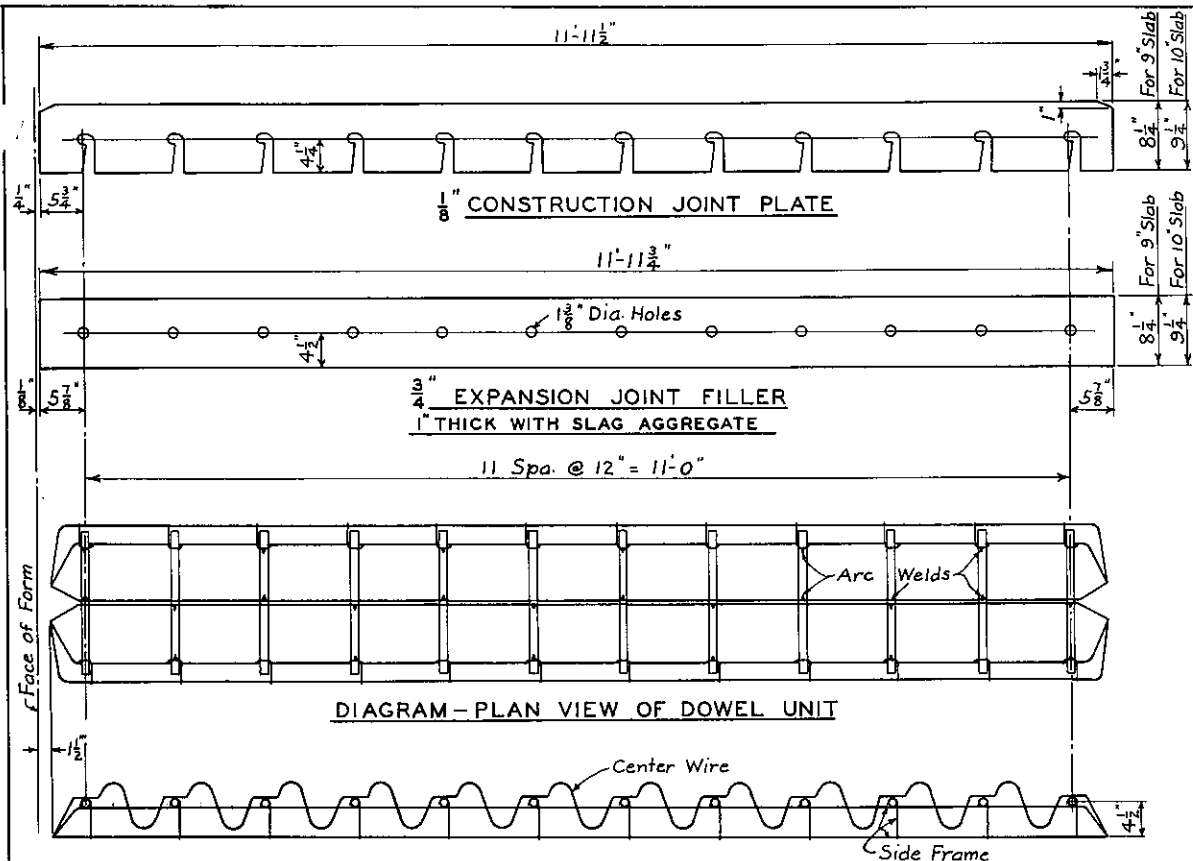


SECTION-BB  
1/2 SIZE SCALE

MANUFACTURED BY:  
ELECTRIC WELDING CO.  
PITTSBURGH 22, PA.

Revised to provide for 1/4" Dowels  
Approved March 28, 1962  
Revised to conform with Std. B-1  
Approved April 22, 1955.  
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
LOAD TRANSFER UNITS  
ASSEMBLY DETAILS  
IN ACCORDANCE WITH DEPARTMENT STANDARD B-1  
APPROVED February 27, 1952  
CHIEF ENGINEER

**TYPE-E**



**GENERAL NOTES**

The Unit shown on this drawing is correct for a 12'-0" lane width. For lanes wider or narrower, dowels are added to or omitted from the unit as shown, always on the basis of 12" center to center spacing.

End Details are standard for all units regardless of number of dowels. Usual lane widths are as follows:

| Lane Width | Over-all length of Unit | No. of Dowels |
|------------|-------------------------|---------------|
| 10'-0"     | 9'-9"                   | 10            |
| 11'-0"     | 10'-9"                  | 11            |
| 12'-0"     | 11'-9"                  | 12            |
| 13'-0"     | 12'-9"                  | 13            |

These load transfer units can be used as received for either expansion or construction joints.

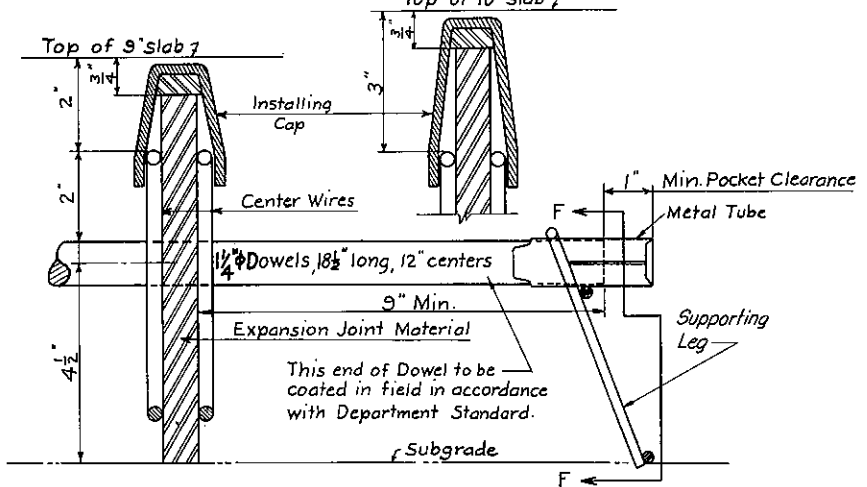
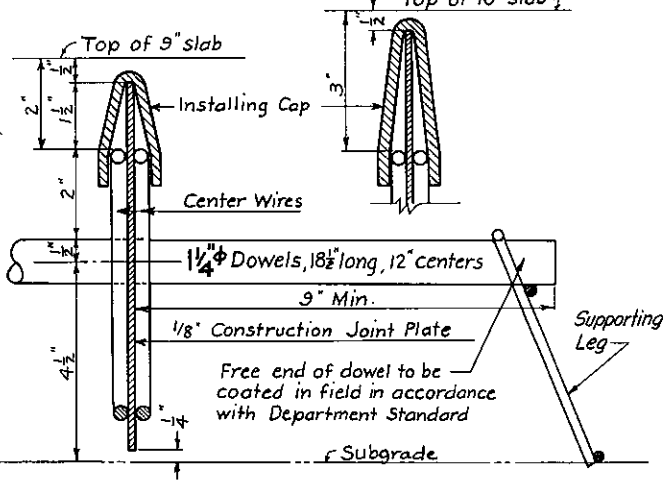
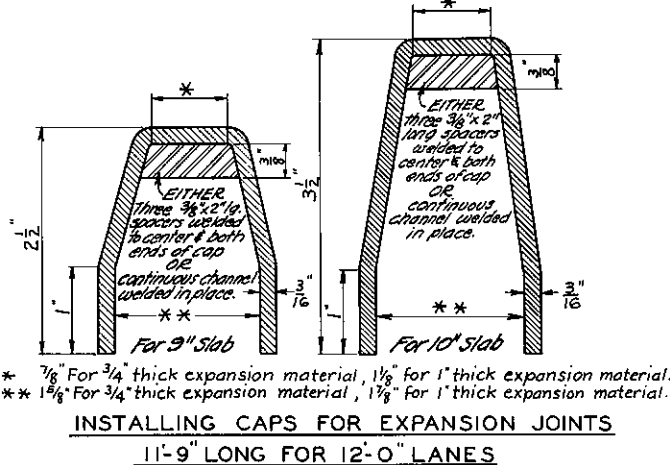
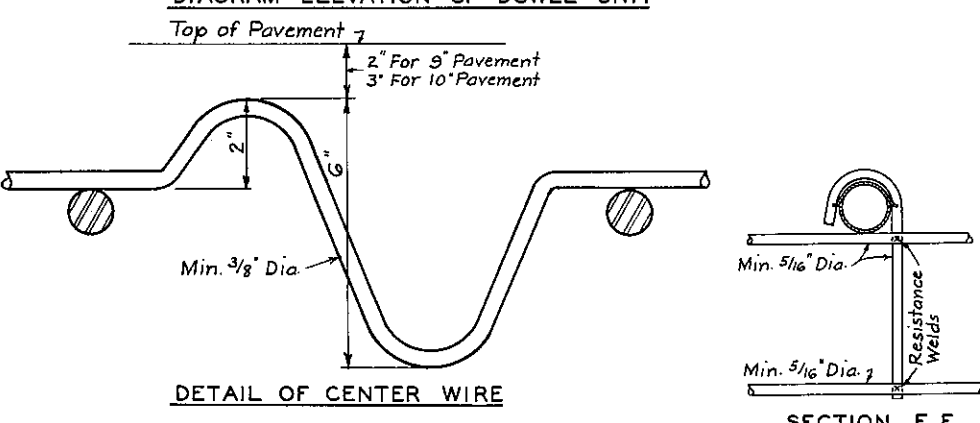
- For expansion joints, the expansion joint material of proper thickness (3/4" or 1"), the metal tubes for dowels with space for expansion, the coating for slip ends of dowels, and the installing cap for joint are to be added to the assembly in the field.
- For construction joints, the steel plate, the installing cap and the coating for slip ends of dowels are to be added to the assembly in the field. The metal tubes are not required.

Standard end guides for holding the expansion joint filler in place shall be provided as required on Standard Drawing B-1. No end guides are required for construction joints.

At least eight stakes shall be furnished for each assembly. They shall be placed as directed by the Engineer. Stakes shall be at least 1/2" in diameter and 15" to 18" in length.

Additional stakes shall be furnished and placed as directed by the Engineer where poor subsoil conditions are encountered during construction.

- The length of stakes may be increased or decreased as directed by the Engineer, depending upon the subgrade conditions encountered.
- The installing cap shall be removed after the first, or after the second pass of the finishing machine, at the discretion of the Engineer.
- Upon removal of the installing cap the resultant space shall be filled promptly with fresh concrete carried back from the mixer.



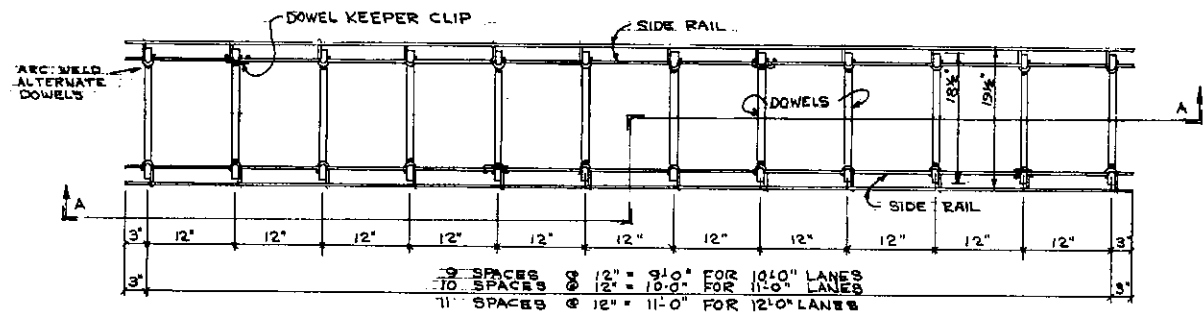
Revised to provide for 1 1/4" Dowels  
 Approved *March 28*, 1962  
 Revised to straighten Supporting Leg.  
 APPROVED *November 1*, 1961

*[Signature]*  
CHIEF ENGINEER

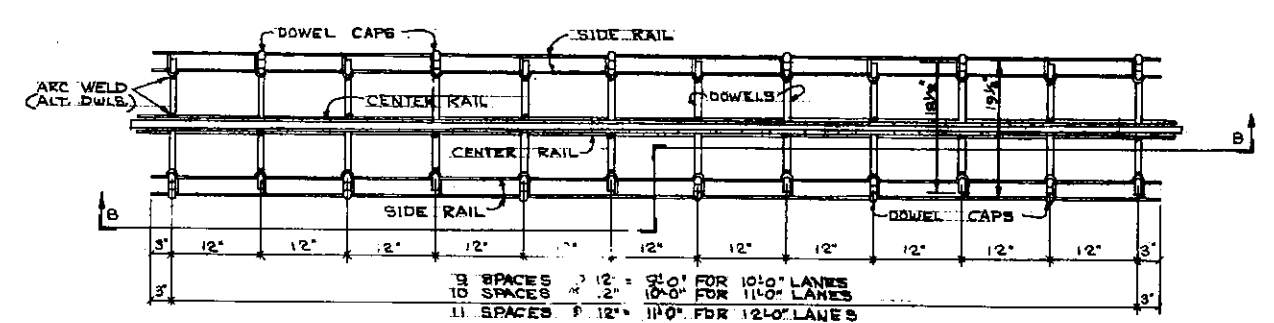
*[Signature]*  
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 ASSEMBLY DETAILS  
 LOAD TRANSFER UNITS  
 AS REQUIRED ON STANDARD DRAWING B-1

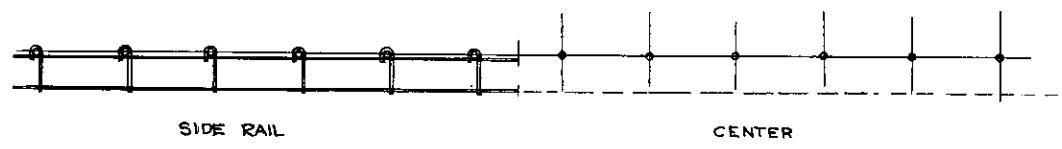
APPROVED *December 27*, 1952  
*[Signature]*  
CHIEF ENGINEER



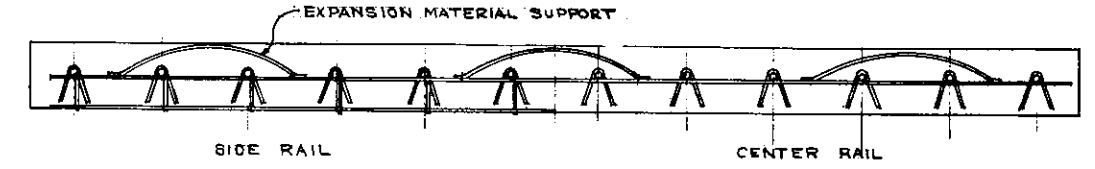
PLAN OF DOWEL UNIT



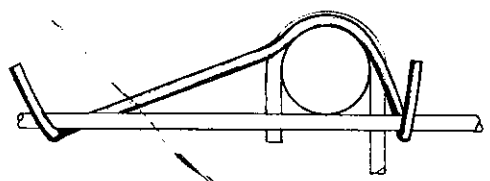
PLAN OF DOWEL UNIT



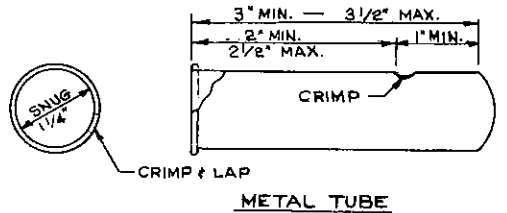
SECTION A-A



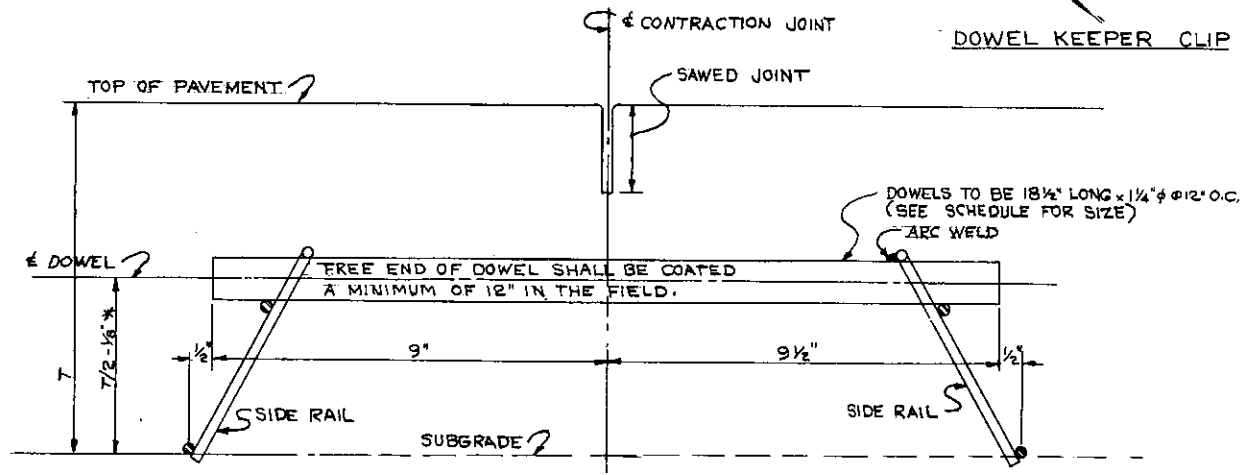
SECTION B-B



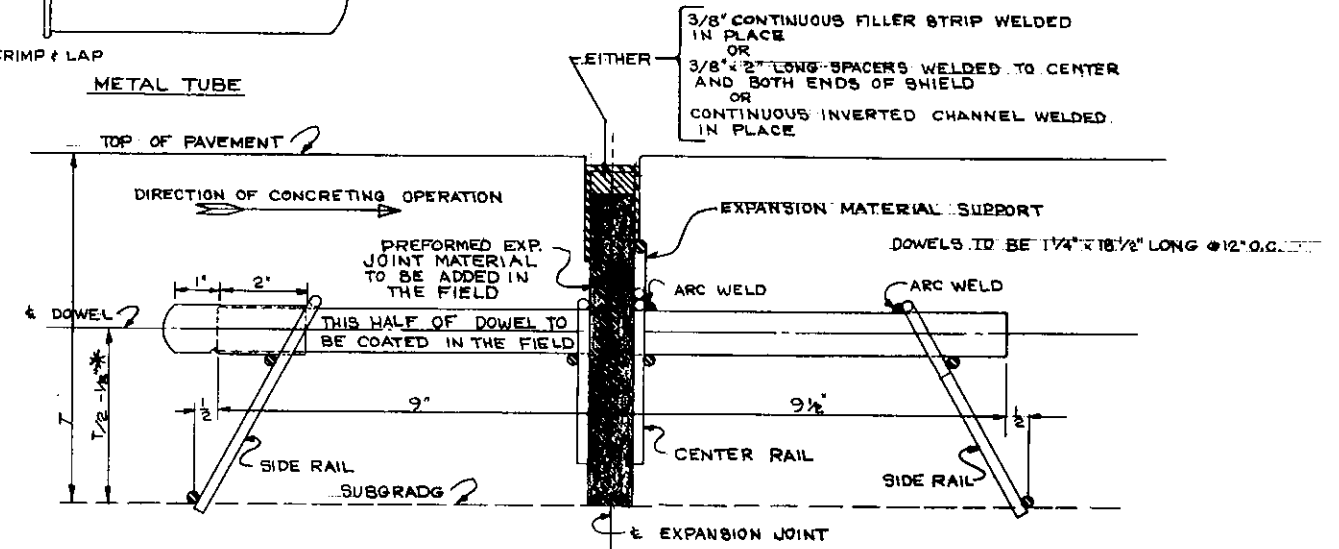
DOWEL KEEPER CLIP



CRIMP & LAP

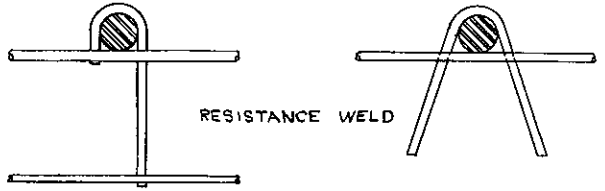


SECTION THRU CONTRACTION JOINT

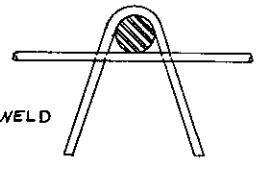


SECTION THRU EXPANSION JOINT

**GENERAL NOTES:**  
 THE DIAMETER OF ALL WIRE SHALL NOT BE LESS THAN 5/16"  
 THE UNITS ARE TO BE SHOP ASSEMBLED AS TO DOWELS AND SIDE RAILS AND SHIPPED NESTED.  
 \* THE CENTER OF DOWELS SHALL BE LOCATED VERTICALLY 1/8" BELOW THE CENTER OF THE SLAB. FOR 8" AND 10" DEPTHS OF PAVING THE DISTANCE FROM SUBGRADE TO THE CENTER LINE OF DOWELS SHOWN AS 4 3/8" FOR 9" PAVING BECOMES 3 7/8" AND 4 7/8" RESPECTIVELY FOR 8" & 10" PAVING.  
 THE UNITS TO BE STAKED IN PLACE BY 1/2" x 1/8" PINS TO A DEPTH AS SUBGRADE CONDITIONS MAKE NECESSARY ALONG BOTH SIDES OF SIDE RAIL A MINIMUM OF 8 STAKES SHALL BE USED FOR EACH ASSEMBLY.



RESISTANCE WELD

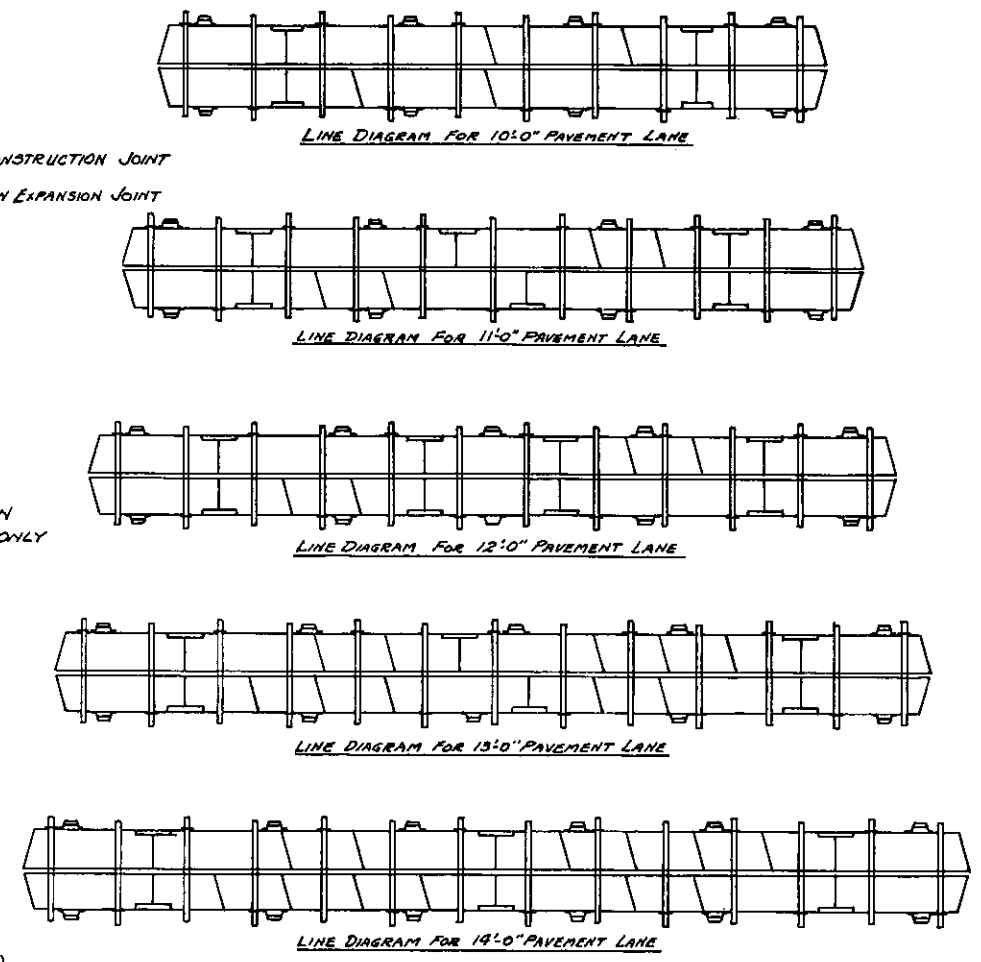
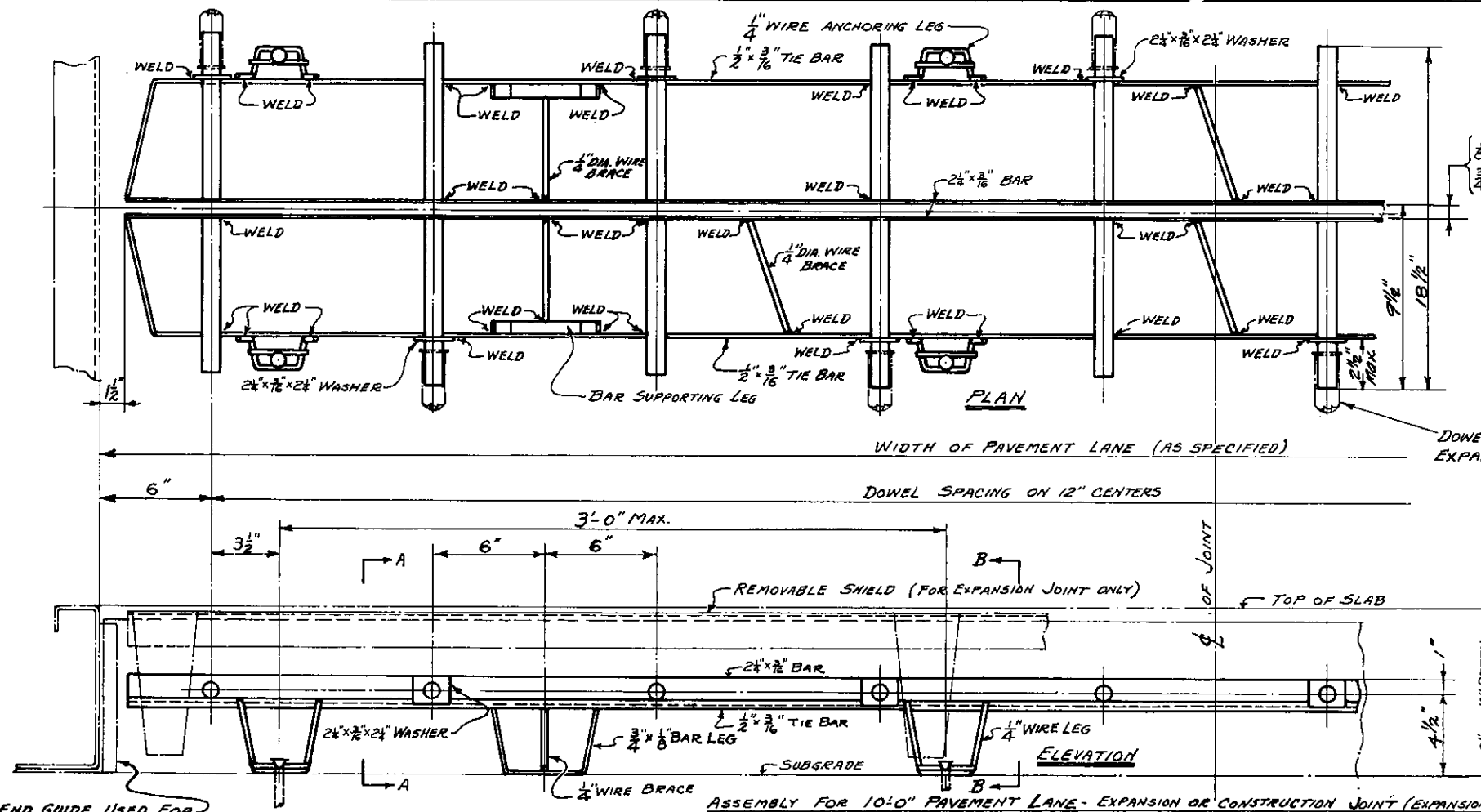


CENTER RAIL DETAIL

**NOTE:** - EITHER THE ABOVE EXPANSION JOINT ASSEMBLY OR TYPE E EXPANSION JOINT ASSEMBLY AS SHOWN ON ATTACHED DWG WILL BE USED

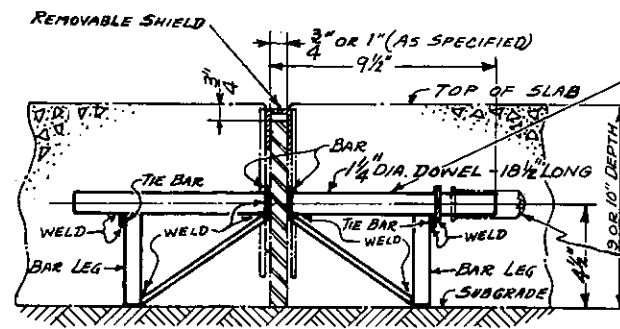
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 LOAD TRANSFER UNITS  
 ASSEMBLY DETAILS - SAWED JOINT  
 IN ACCORDANCE WITH DEPARTMENT STANDARD B-1  
 APPROVED September 28, 1965  
 W. M. ...  
 CHIEF ENGINEER

**TYPE-J**

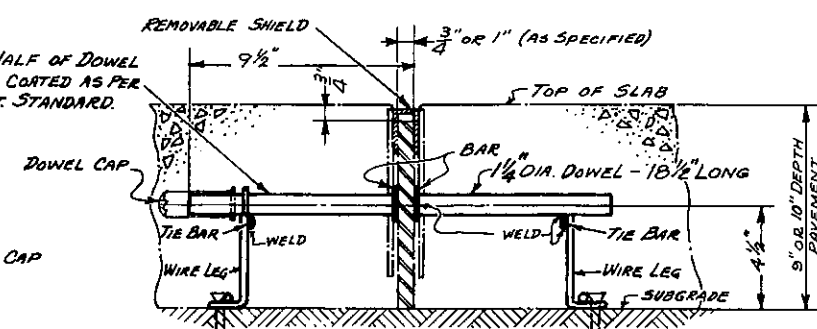


END GUIDE USED FOR EXPANSION JOINT ONLY

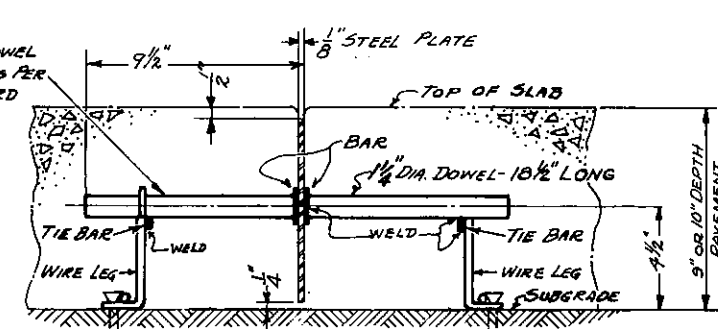
ASSEMBLY FOR 10'-0" PAVEMENT LANE - EXPANSION OR CONSTRUCTION JOINT (EXPANSION JOINT SHOWN)  
 NOTE: FOR COMPLETE ASSEMBLIES FOR ALL WIDTHS OF PAVEMENT LANES SEE LINE DIAGRAMS.



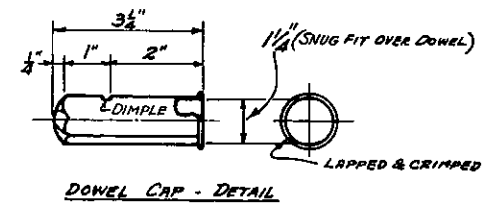
SECTION A-A THRU EXPANSION JOINT SHOWING BRACING OF BAR SUPPORTING LEGS



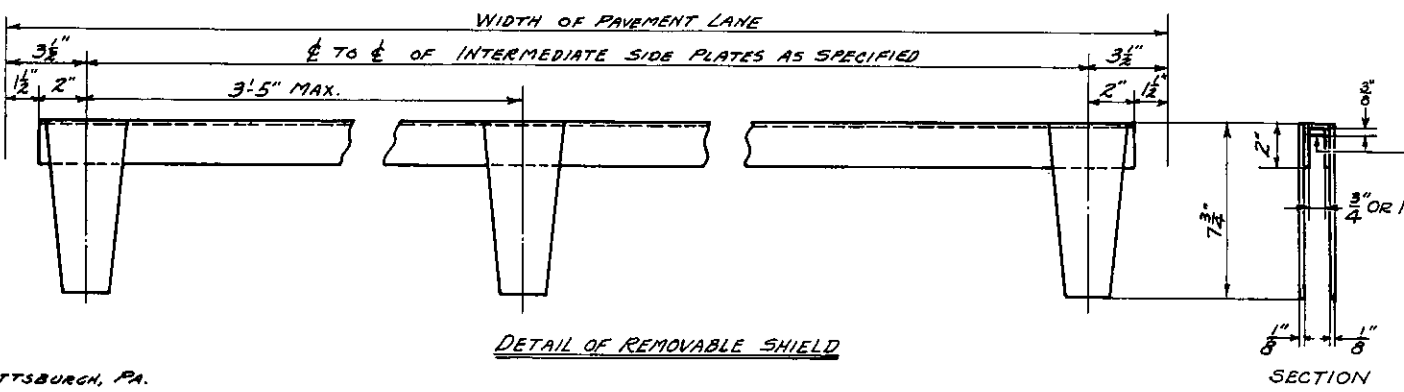
SECTION B-B THRU EXPANSION JOINT SHOWING WIRE ANCHORING LEGS



SECTION THRU CONSTRUCTION JOINT



**NOTES**  
 End guides as shown on Standard Drawing B-1 shall be used at all transverse expansion joints. End guides are not required for transverse construction joints.  
 Dowel caps are not required for transverse construction joints.  
 Holes for dowels in premolded expansion material shall be punched to provide a snug fit without loss in thickness of material.  
 Spikes shall be used in all wire legs. The length of spikes shall be varied as directed by the engineer, depending on subgrade and subsoil conditions.



DETAIL OF REMOVABLE SHIELD

3/8" x 2" SPACERS WELDED TO CENTER & BOTH ENDS OF SHIELD OR  
 3" CONTINUOUS FILLER WELDED IN PLACE, OR  
 CONTINUOUS INVERTED CHANNEL WELDED IN PLACE.

MADE BY PITTSBURGH STEEL PRODUCTS, PITTSBURGH, PA.

Revised to provide for 1 1/4" Dowels  
 Approved: *[Signature]* November 28, 1962  
 CHIEF ENGINEER

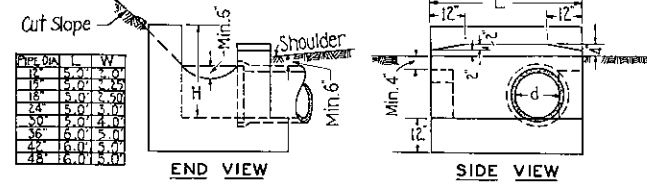
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF HIGHWAYS**  
**ASSEMBLY DETAILS**  
**LOAD TRANSFER UNITS**  
 IN ACCORDANCE WITH DEPARTMENT STANDARD B-1

APPROVED: *[Signature]* November 1, 1961  
 CHIEF ENGINEER

**TYPE H**



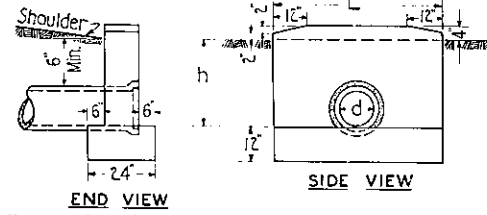
If pipe is on grade, place pipe in down grade end of box, upgrade spacer wall concave, downgrade spacer wall level.  
If pipe is at low point, place pipe in middle of shoulder wall and both spacer walls concave.  
Exposed edges of endwall shall be chamfered one (1) inch.



Cut slope governs dimension H

**TYPE A ENDWALL**

$L = 2h + d - 24"$   
Minimum  $L = 5'-0"$   
Exposed edges shall be chamfered one (1) inch.

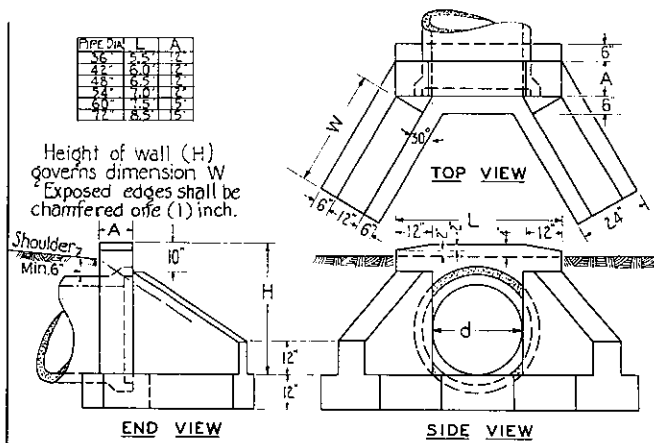


When shoulder fill above top of pipe exceeds two (2) ft. use Type D endwall and additional pipe.

**TYPE B ENDWALL**

| PIPE DIA. | L   | A |
|-----------|-----|---|
| 36        | 5.5 | 2 |
| 42        | 6.0 | 2 |
| 48        | 6.5 | 2 |
| 54        | 7.0 | 2 |
| 60        | 7.5 | 2 |

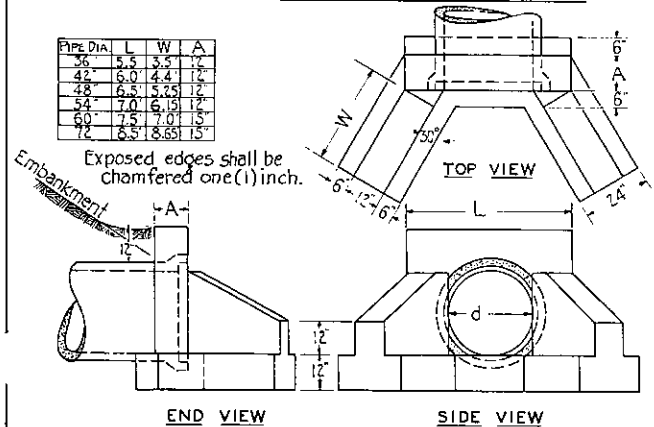
Height of wall (H) governs dimension W  
Exposed edges shall be chamfered one (1) inch.



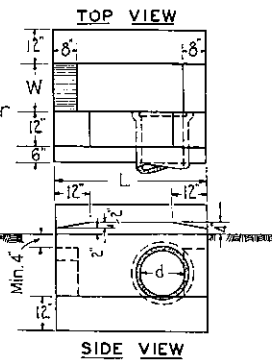
**TYPE B-W ENDWALL**

| PIPE DIA. | L   | W   | A |
|-----------|-----|-----|---|
| 36        | 5.5 | 3.5 | 2 |
| 42        | 6.0 | 4.4 | 2 |
| 48        | 6.5 | 5.3 | 2 |
| 54        | 7.0 | 6.1 | 2 |
| 60        | 7.5 | 6.9 | 2 |

Exposed edges shall be chamfered one (1) inch.

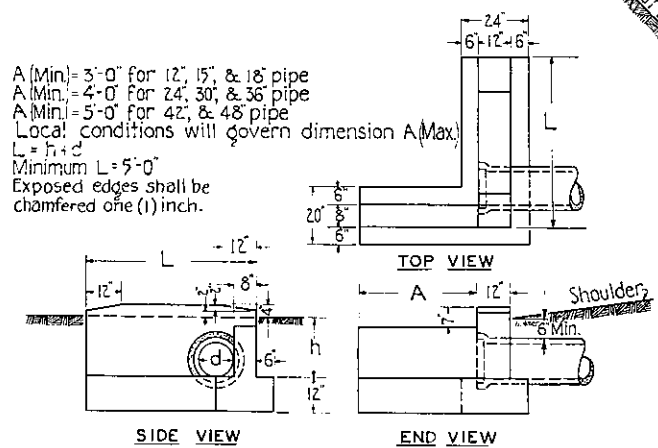


**TYPE D-W ENDWALL**



**TYPE D ENDWALL**

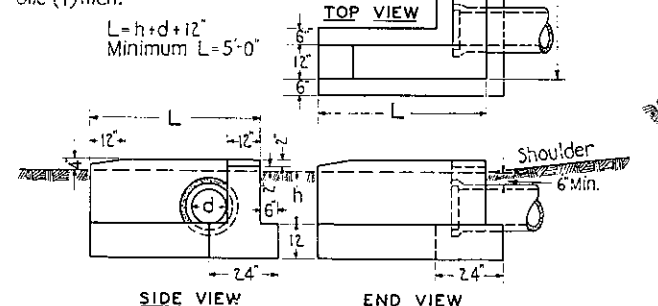
A (Min.) = 3'-0" for 12", 15", & 18" pipe  
A (Min.) = 4'-0" for 24", 30", & 36" pipe  
A (Min.) = 5'-0" for 42", & 48" pipe  
Local conditions will govern dimension A (Max.)  
 $L = h + d$   
Minimum  $L = 5'-0"$   
Exposed edges shall be chamfered one (1) inch.



**TYPE E ENDWALL**

Side road wall to be parallel to side road, both as to line and grade.  
Exposed edges shall be chamfered one (1) inch.

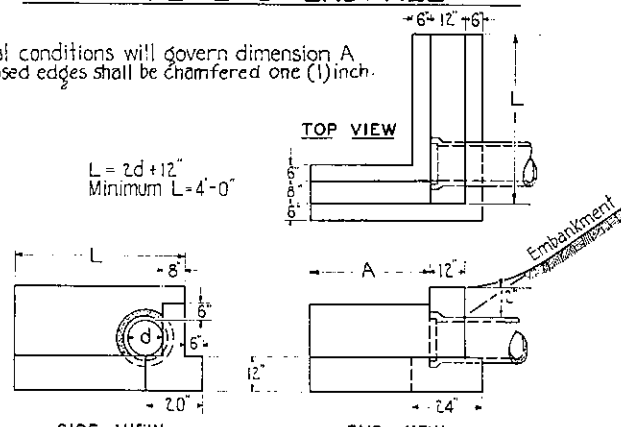
$L = h + d + 12"$   
Minimum  $L = 5'-0"$



**TYPE E-S ENDWALL**

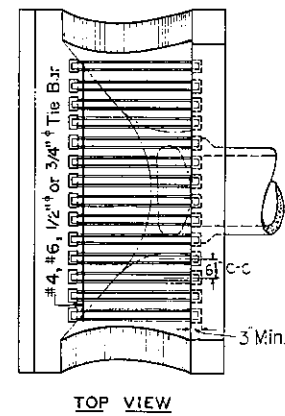
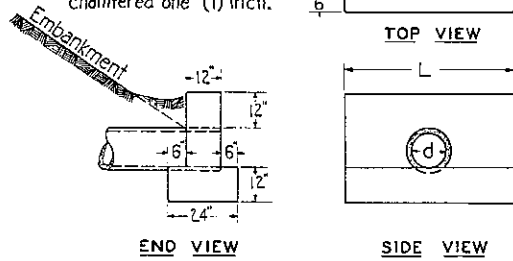
Local conditions will govern dimension A  
Exposed edges shall be chamfered one (1) inch.

$L = 2d + 12"$   
Minimum  $L = 4'-0"$



**TYPE D-E ENDWALL**

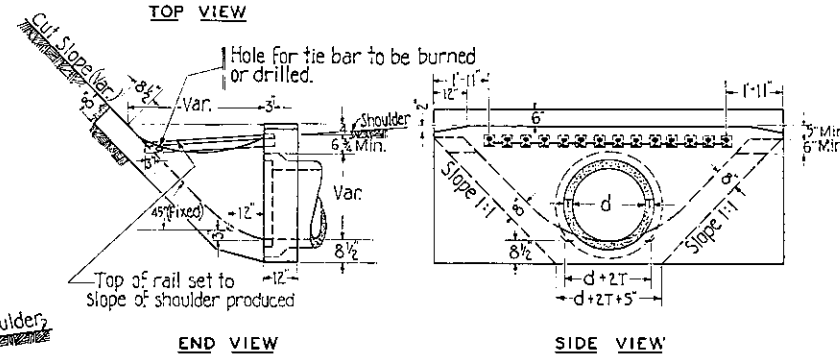
$L = 3d - 24"$   
Minimum  $L = 4'$   
Exposed edges shall be chamfered one (1) inch.



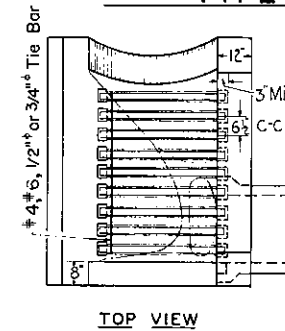
3 1/2 - 40" A.S.C.E. rails spaced 6 1/2 on centers.  
Length of rails variable. Slope wall end of rail rests in slot with 3" seat. Near end of rail extends into socket with 3" seat.

Exposed edges shall be chamfered one (1) inch.

All corners on inside of endwall shall be rounded with concrete as shown.

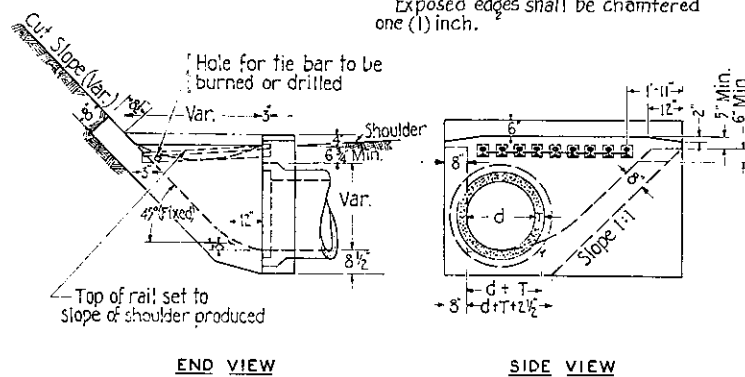


**TYPE F-1 ENDWALL**



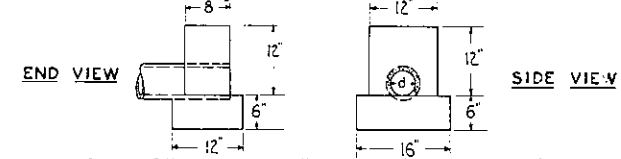
3 1/2 - 40" A.S.C.E. rails spaced 6 1/2 on centers. Length of rails variable.  
Slope wall end of rail rests in slot with 3" seat. Near end of rail extends into socket with 3" seat.

All corners on inside of endwall shall be rounded with concrete as shown.  
Exposed edges shall be chamfered one (1) inch.



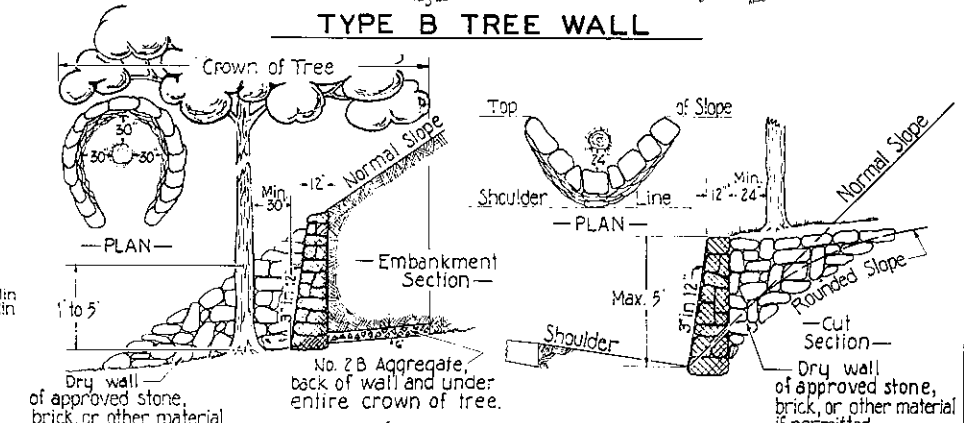
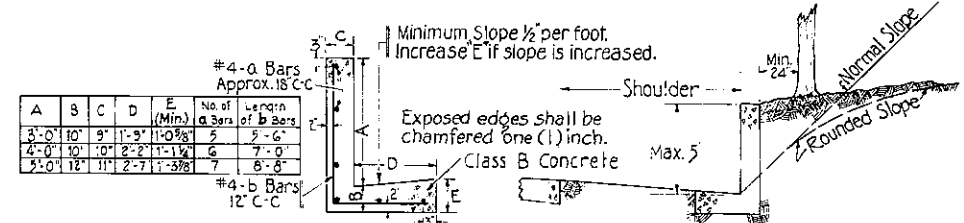
**TYPE F-2 ENDWALL**

Exposed edges shall be chamfered one (1) inch

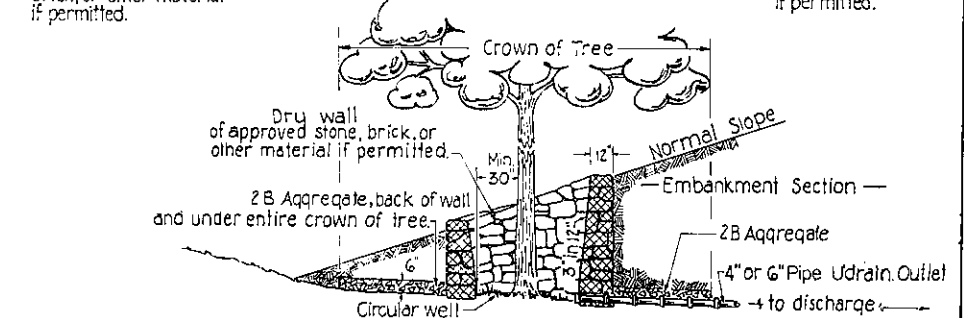


The design of this endwall shall be varied to suit location of outlet

**PIPE UNDERDRAIN OUTLET ENDWALL**



**TYPE B TREE WALL**



**TYPE A TREE WALLS**

|   |                                  |                                      |
|---|----------------------------------|--------------------------------------|
| Revised to require rails for F Type Endwalls, and for Bar Designations. | APPROVED <u>November 1, 1961</u> | <i>[Signature]</i><br>CHIEF ENGINEER |
| Revised for Construction Details of Types A and B Tree Walls.           | APPROVED <u>March 26, 1947</u>   | <i>[Signature]</i><br>CHIEF ENGINEER |
| Revised for Construction Details and to delete Guard Posts              | APPROVED <u>January 2, 1941</u>  | <i>[Signature]</i><br>CHIEF ENGINEER |
| Revised to include Guard Posts.   | APPROVED <u>July 1, 1940</u>     | <i>[Signature]</i><br>CHIEF ENGINEER |
| Revised for construction details of Types B-W and D-W Endwalls          | APPROVED <u>1939</u>             | <i>[Signature]</i><br>CHIEF ENGINEER |

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS**

**—STANDARD DETAILS—**

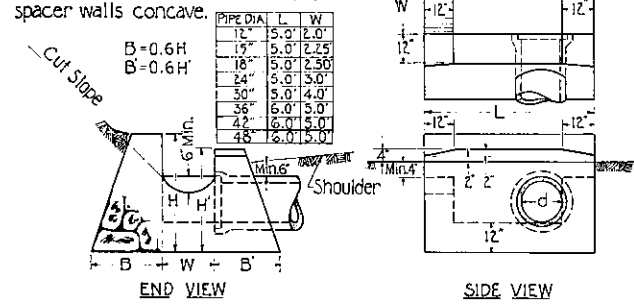
**CLASS B CONCRETE ENDWALLS  
AND TYPES A & B TREE WALLS**

APPROVED April 7, 1939

*[Signature]*  
CHIEF ENGINEER

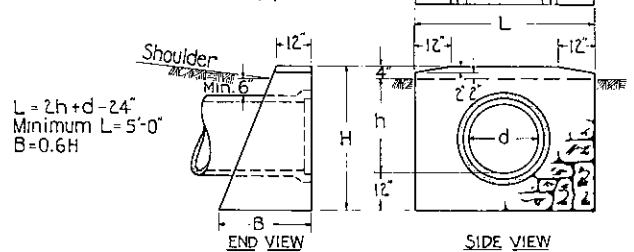
**SD-1**

Cut slope governs dimension H.  
If pipe is on grade, place pipe in down grade end of box, upgrade spacer wall concave, downgrade spacer wall level.  
If pipe is at low point, place pipe in middle of shoulder wall and both spacer walls concave.



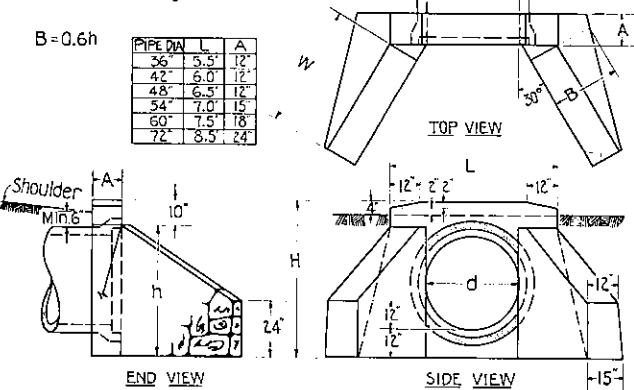
TYPE A ENDWALL

When shoulder fill above top of pipe exceeds two (2) feet use Type D endwall and additional pipe.

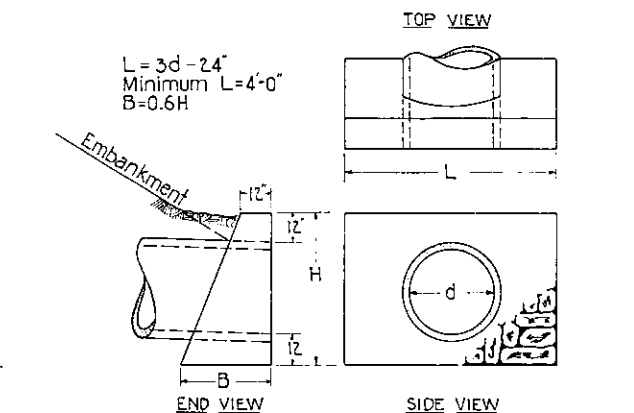


TYPE B ENDWALL

Height of wall h governs dimension W

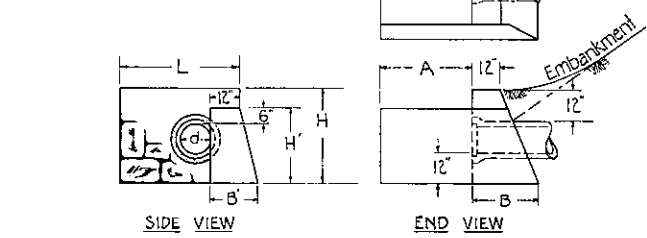


TYPE B-W ENDWALL

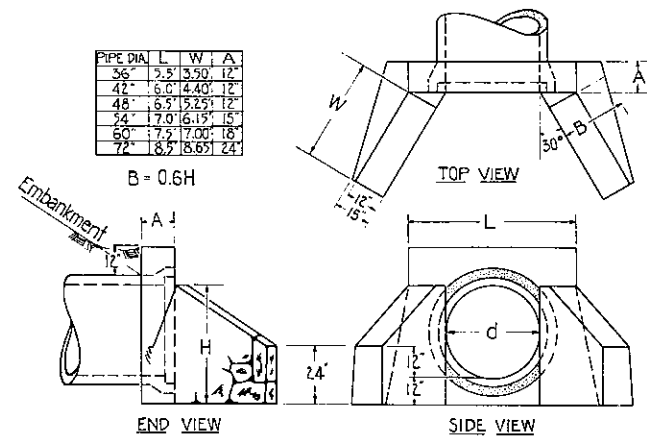


TYPE D ENDWALL

Local conditions govern dimension A  
 $L = 2d + 12"$   
Minimum  $L = 4'-0"$   
 $B = 0.6H$   
 $B' = 0.6H'$

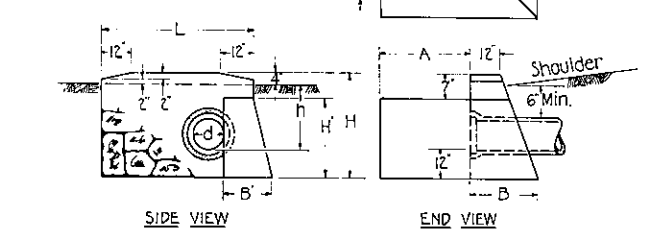


TYPE D-E ENDWALL



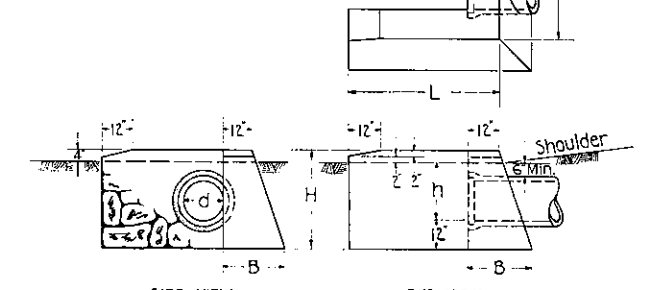
TYPE D-W ENDWALL

Local conditions govern dimension A (Max.)  
A (Min.) = 3'-0" for 12", 15" & 18" pipe  
A (Min.) = 4'-0" for 24", 30" & 36" pipe  
A (Min.) = 5'-0" for 42" & 48" pipe  
 $L = h + d$   
Minimum  $L = 5'-0"$   
 $B = 0.6H$   
 $B' = 0.6H'$

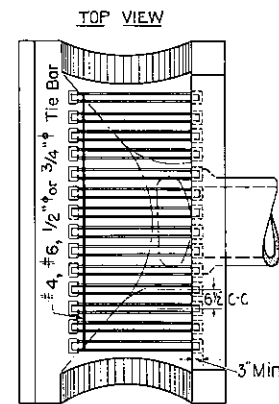


TYPE E ENDWALL

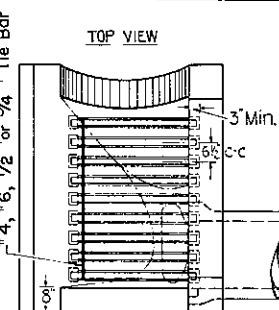
Side road wall shall be parallel to side road, both as to line and grade.  
 $L = h + d + 12"$   
Minimum  $L = 5'-0"$   
 $B = 0.6H$



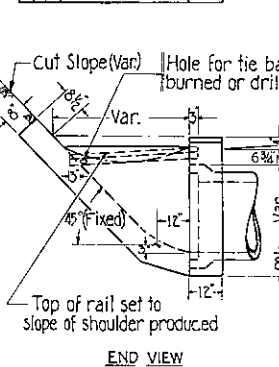
TYPE E-S ENDWALL



TYPE F-1 ENDWALL



TYPE F-2 ENDWALL



PIPE UNDERDRAIN OUTLET ENDWALL

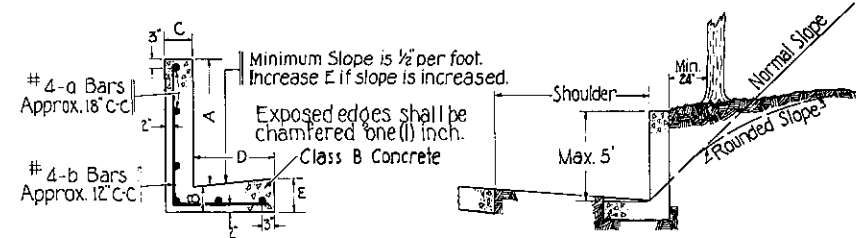
3 1/2 - 40# A. S. C. E. rails spaced 6 1/2 on centers. Length of rails variable. Slope wall end of rail rests in slot with 3' seat. Near end of rail extends into socket with 3' seat.

All corners on inside of endwall shall be rounded with concrete as shown. Exposed edges shall be chamfered one (1) inch. This endwall to be used at low point, and shall at all times be constructed of Class B Concrete.

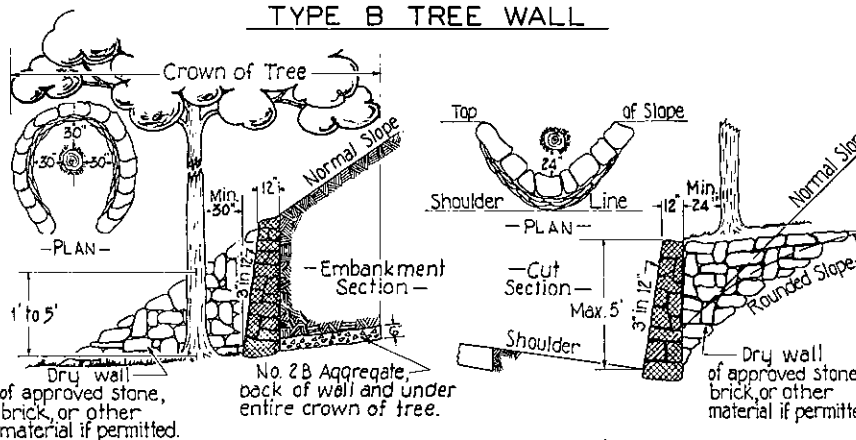
3 1/2 - 40# A. S. C. E. rails spaced 6 1/2 on centers. Length of rails variable. Slope wall end of rail rests in slot with 3' seat. Near end of rail extends into socket with 3' seat.

All corners on inside of endwall shall be rounded with concrete as shown. Exposed edges shall be chamfered one (1) inch. This endwall to be used on grade, and shall at all times be constructed of Class B Concrete.

The design of this endwall shall be varied to suit location of outlet.



TYPE B TREE WALL

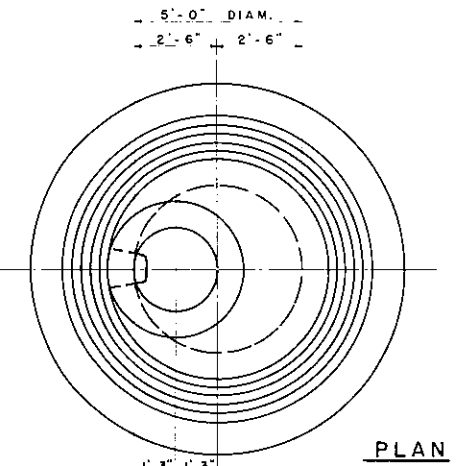


TYPE A TREE WALLS

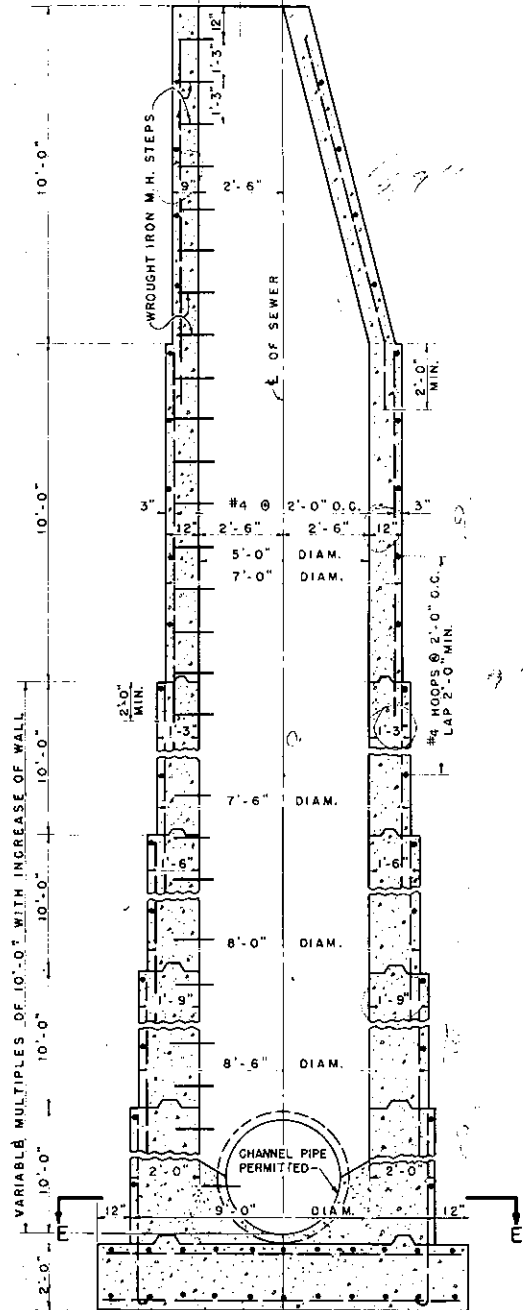
|   |  |
|---|--|
| Revised to require rails for F Type Endwalls, and for Bar Designations. | APPROVED <i>November 1, 1961</i> <i>Fred L. ...</i> CHIEF ENGINEER |
| Revised for Construction Details of Types A and B Tree Walls.           | APPROVED <i>March 24, 1947</i> <i>Ed. ...</i> CHIEF ENGINEER       |
| Revised for Construction Details and to delete Guard Posts.             | APPROVED <i>January 2, 1941</i> <i>J. ...</i> CHIEF ENGINEER       |
| Revised to include Guard Posts.   | APPROVED <i>11-24-1940</i> <i>J. ...</i> CHIEF ENGINEER            |
| Revised for construction details of Types B-W and D-W Endwalls.         | APPROVED <i>1939</i> <i>J. ...</i> CHIEF ENGINEER                  |

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
—STANDARD DETAILS—  
CEMENT RUBBLE MASONRY ENDWALLS  
TYPES F-1 & F-2 ENDWALLS (CONCRETE)  
AND TYPES A & B TREE WALLS  
APPROVED *April 14, 1939* *J. ...* CHIEF ENGINEER

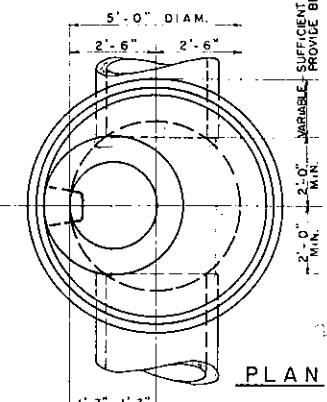




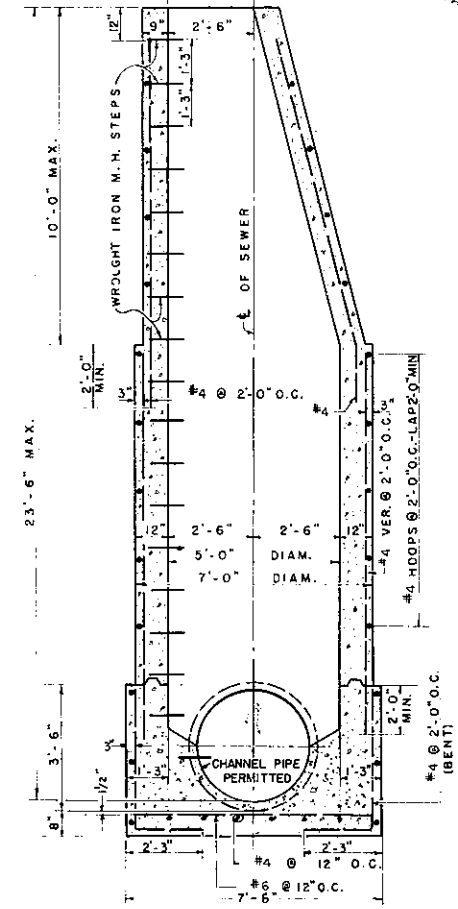
PLAN



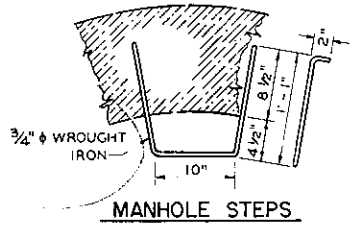
SECTION - TYPE D  
(FOR PIPES 42" DIA. & LESS)



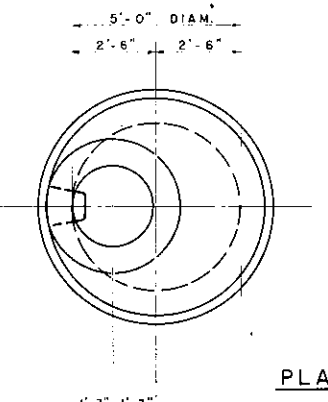
PLAN



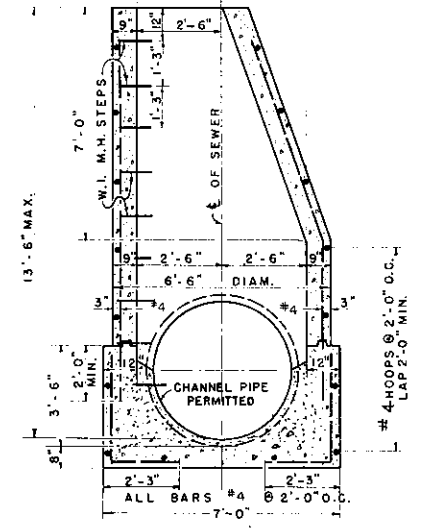
SECTION - TYPE C  
(FOR PIPES 42" DIA. & LESS)



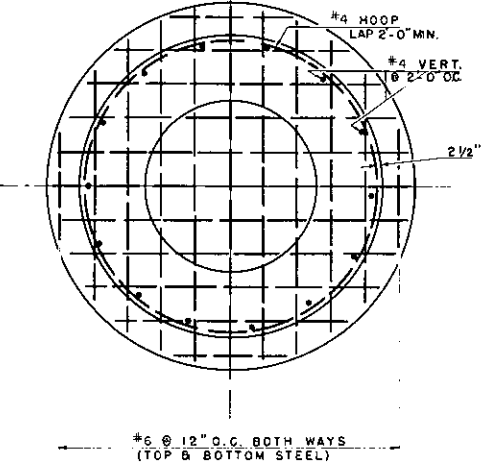
MANHOLE STEPS



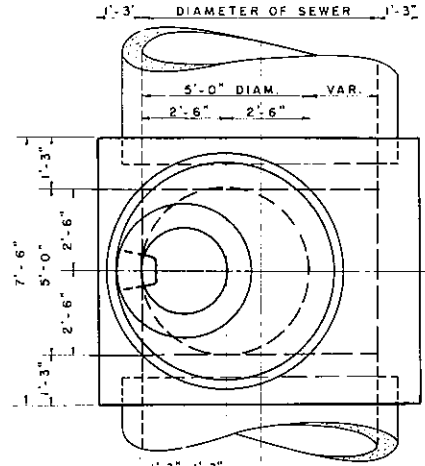
PLAN



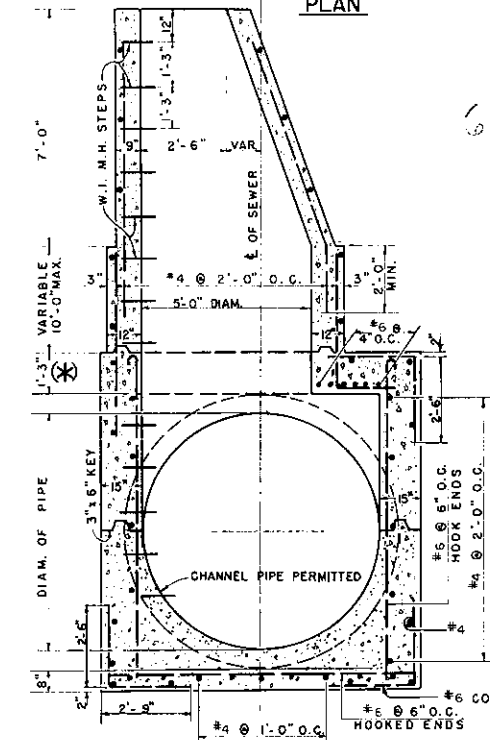
SECTION - TYPE B  
(FOR PIPES 42" DIA. & LESS)



SEC. E-E  
OF MANHOLE - TYPE D  
INDICATING FOUNDATION REINFORCEMENT

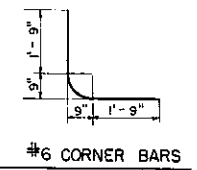


PLAN



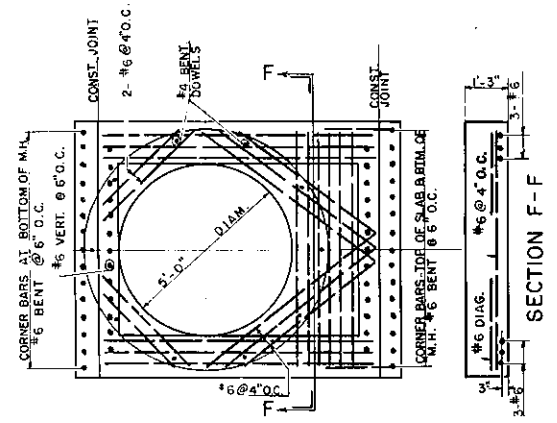
SECTION  
(FOR PIPES 48" DIA. AND GREATER)

TYPE B or C - CONSTRUCT AS SHOWN.  
TYPE D - CONSTRUCT SIMILAR TO ABOVE  
USING 1'-6" THICKNESS FOR TOP OF  
BOX STRUCTURE (\*), AND THE WALL  
THICKNESSES, BASE THICKNESS AND  
REINFORCEMENT SHOWN ON "SECTION -  
TYPE D."

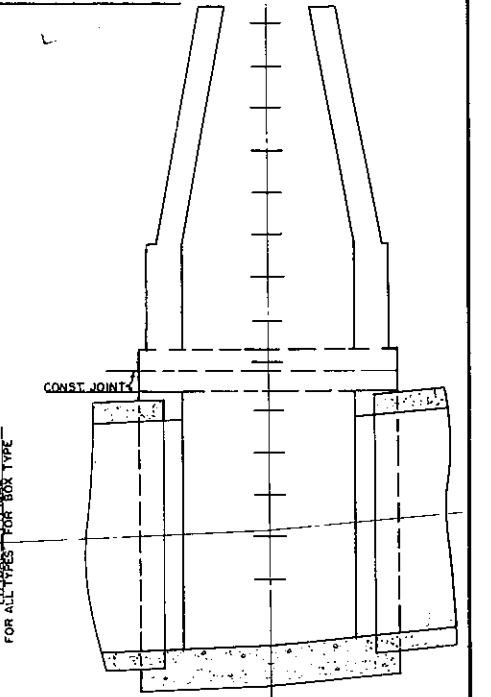


TYPICAL HOOKED ENDS

NOTES  
ALL CONCRETE SHALL BE CLASS A.  
ALL BARS STRAIGHT UNLESS MARKED OTHERWISE.  
MINIMUM LAP OF BARS = 45 DIAM.  
DEPTH & SIZE OF FOOTING SUBJECT TO CHANGE  
DUE TO SOIL - TO BE DETERMINED BY THE ENGR.  
3" x 6" KEYS AT CONSTRUCTION JOINTS.  
SCALE ON THIS SHEET 3/8" = 1'-0"



PLAN OF SLAB OVER PIPE  
INDICATING PLACING OF BARS



TYPICAL LONGITUDINAL SECTION  
FOR REINFORCEMENT SEE PLAN & X-SECTION

Revised for Bar Designations - Sheets 1 and 2.  
APPROVED November 1, 1961

Chief Engineer

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
STANDARD DETAILS  
MANHOLES - TYPES A, B, C & D

APPROVED September 3, 1946

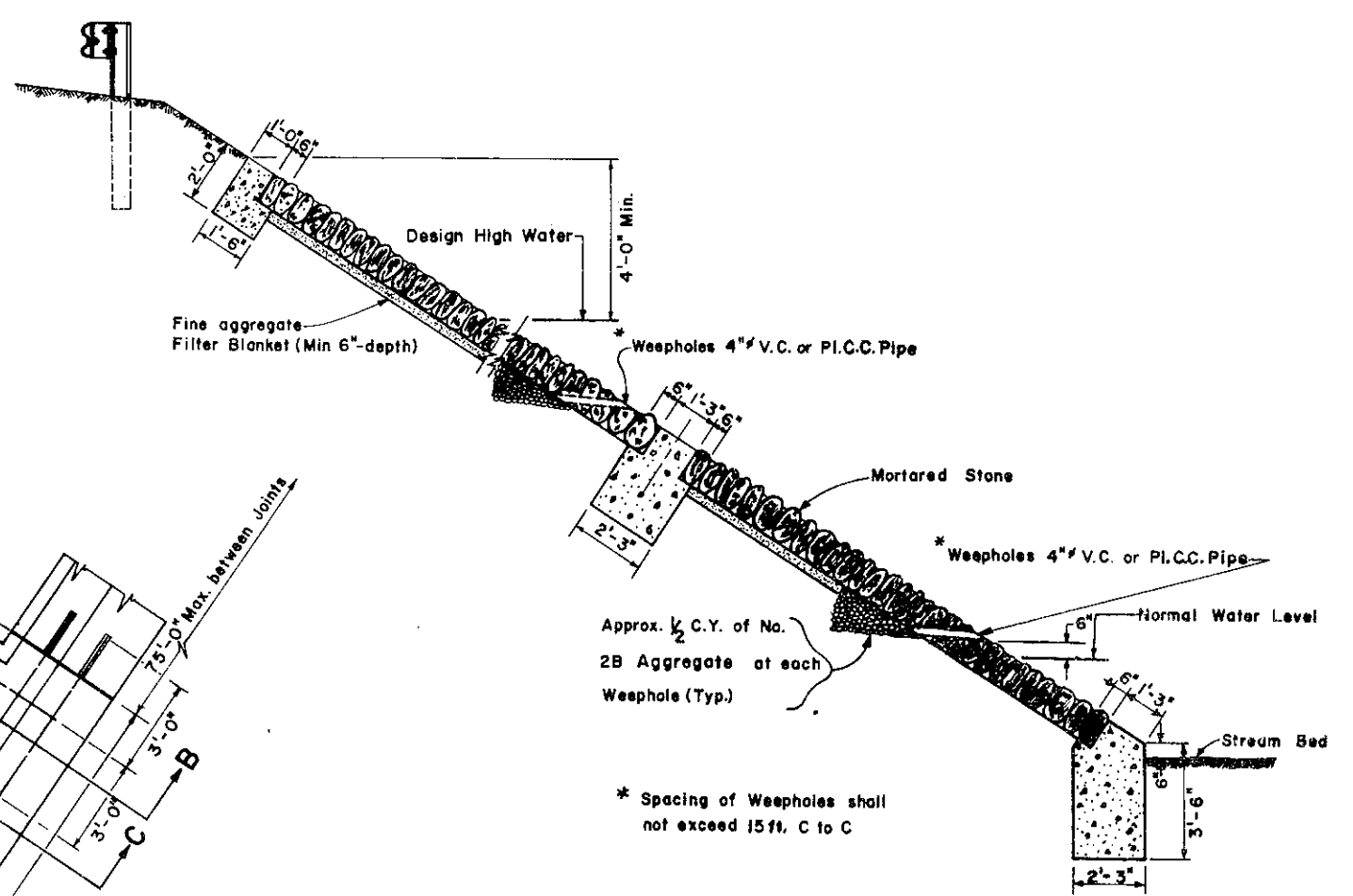
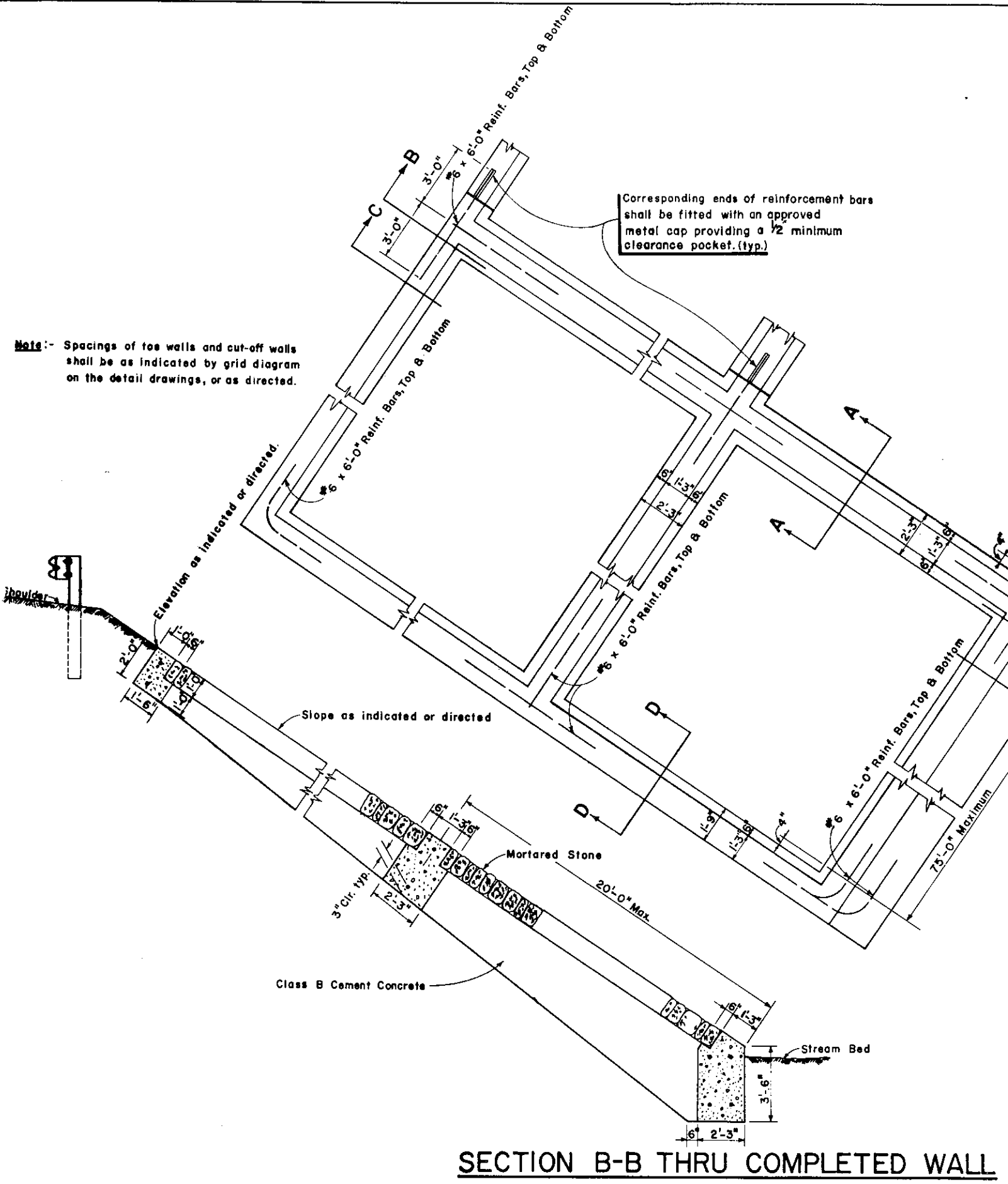
Chief Engineer

SHEET 1 OF 2  
SD-6

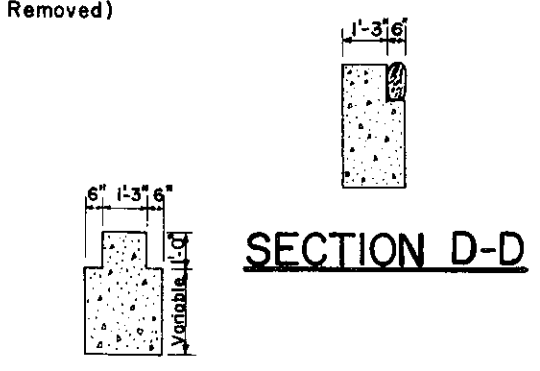
TRACED BY  
FINAL BY



**Note:** Spacings of toe walls and cut-off walls shall be as indicated by grid diagram on the detail drawings, or as directed.



**GRID DETAIL**  
(Stone Removed)



**SECTION A-A**

**SECTION B-B THRU COMPLETED WALL**

Revised to show Filter Blanket and Weep Holes  
Approved October 14, 1969

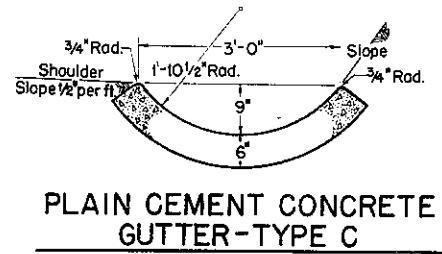
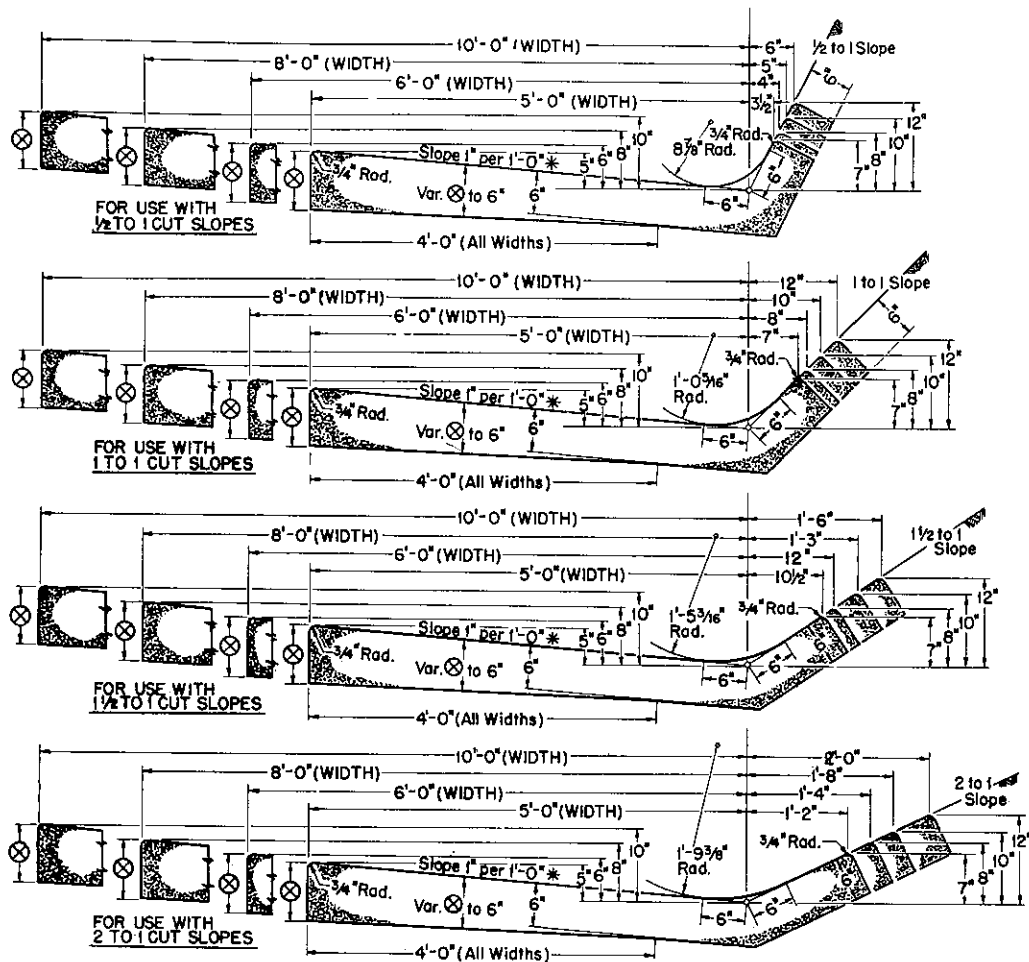
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
SPECIAL MORTARED STONE SLOPE WALL

APPROVED October 14, 1969

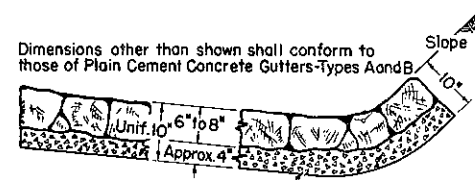
*W. Anselaitis*  
CHIEF ENGINEER

SHEET 1 of 1  
**SD-7**

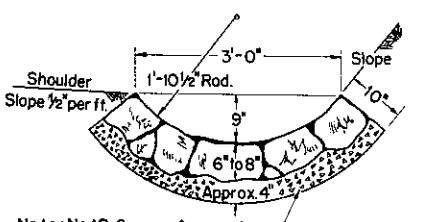




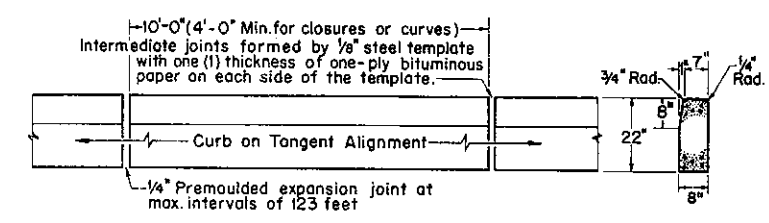
**PLAIN CEMENT CONCRETE GUTTER-TYPE C**



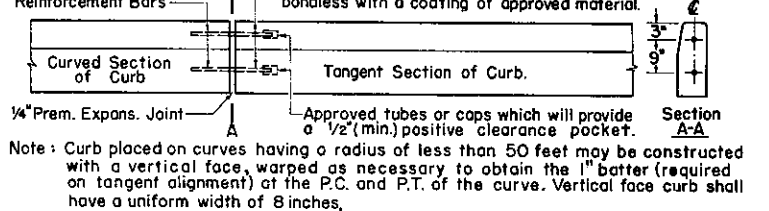
**PLAIN OR MORTARED RUBBLE GUTTER-TYPE A**



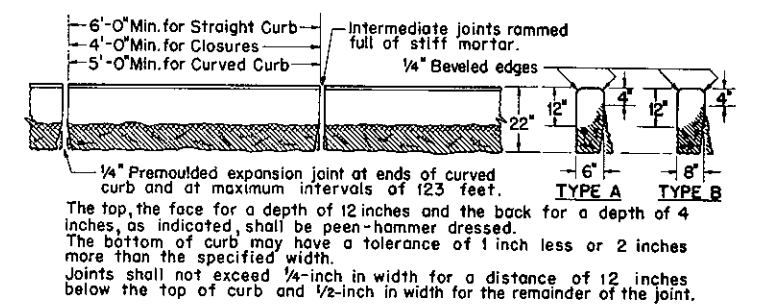
**PLAIN OR MORTARED RUBBLE GUTTER-TYPE C**



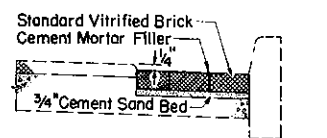
**PLAIN CEMENT CONCRETE CURB**



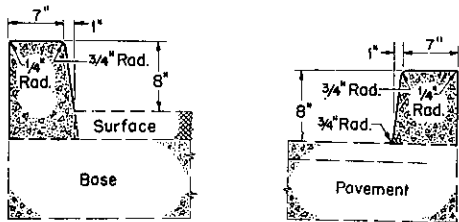
**PLAIN CEMENT CONCRETE CURB**



**STONE CURB - TYPES A & B**



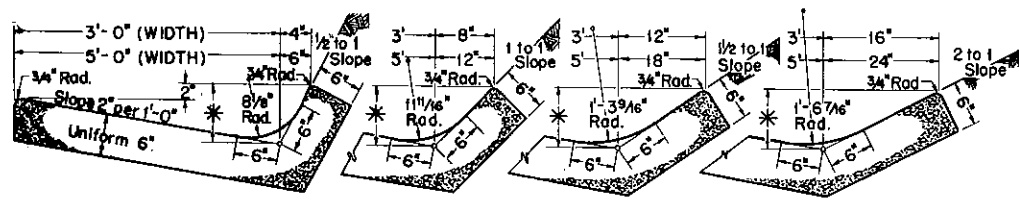
**VITRIFIED BRICK GUTTER**



**INTEGRAL CEMENT CONCRETE CURB**

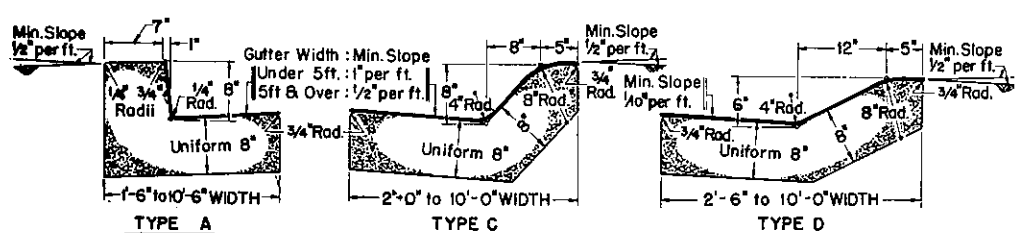
⊗ 8 inches - when gutter is in contact with 8-inch rigid type pavements and with all flexible type pavements.  
 ⊙ 9 inches - when gutter is in contact with 9-inch and 10-inch rigid type pavements and with all rigid type bases.  
 \* - Or as directed. Always adjust back edge of gutter to maintain the required 2 inches above the edge adjacent to paving.

**NOTE: THESE DESIGNS SHALL BE USED WHEN GUTTER IS IN CONTACT WITH ADJACENT PAVING.**  
**5, 6, 8 & 10-FOOT PLAIN CEMENT CONCRETE GUTTERS - TYPE A**



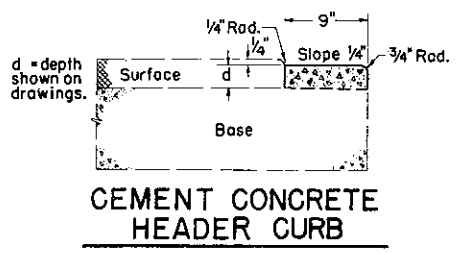
\* 8 inches for the 3'-0" width of gutter.  
 \* 12 inches for the 5'-0" width of gutter.  
 The slope of shoulder from edge of pavement to gutter shall be 1/2-inch per foot.

**NOTE: THESE DESIGNS SHALL BE USED WHEN GUTTER IS NOT IN CONTACT WITH ADJACENT PAVING.**  
**3 & 5-FOOT PLAIN CEMENT CONCRETE GUTTERS - TYPE B**



The width of gutter used in computing the pay area is indicated by \_\_\_\_\_.  
 These gutters shall be reinforced when indicated on the drawings or specified.  
 Curb face of Types - A may be constructed vertical as permitted for PLAIN CEMENT CONCRETE CURB

**PLAIN CEMENT CONCRETE CURB GUTTERS - TYPES A,C&D**

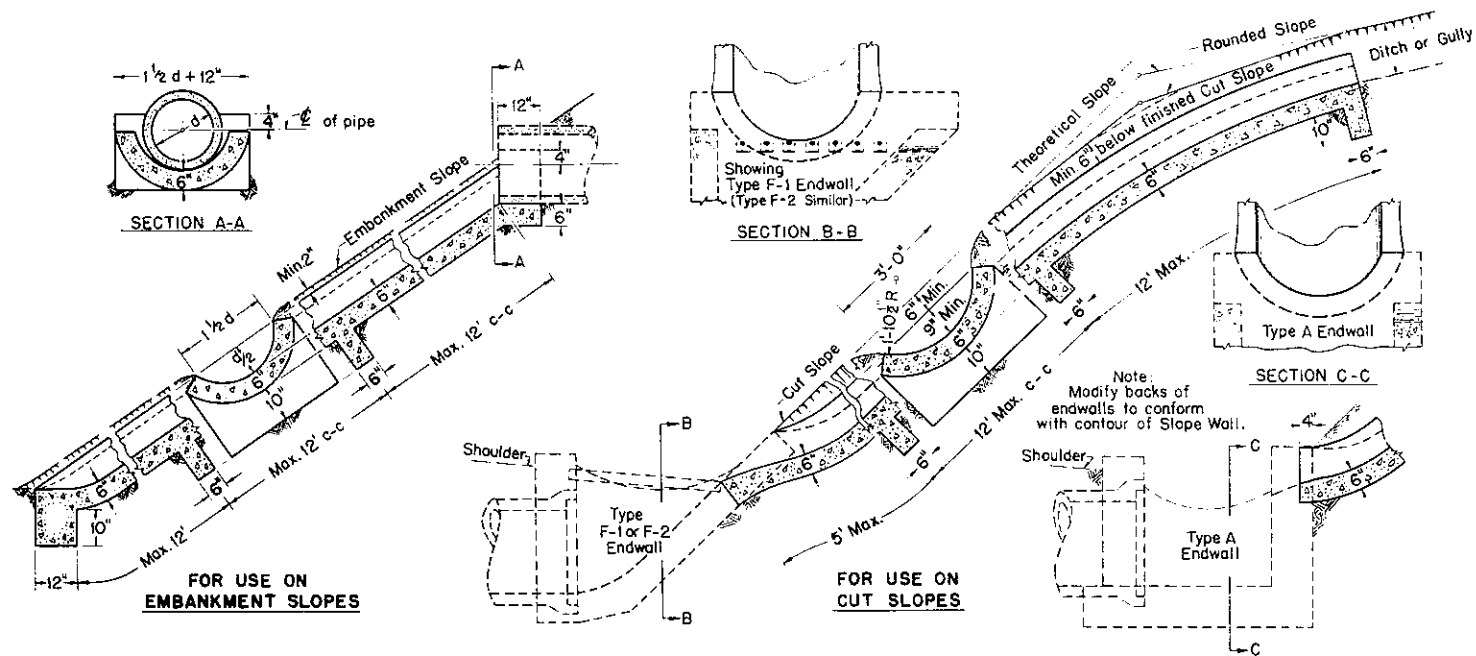


**CEMENT CONCRETE HEADER CURB**

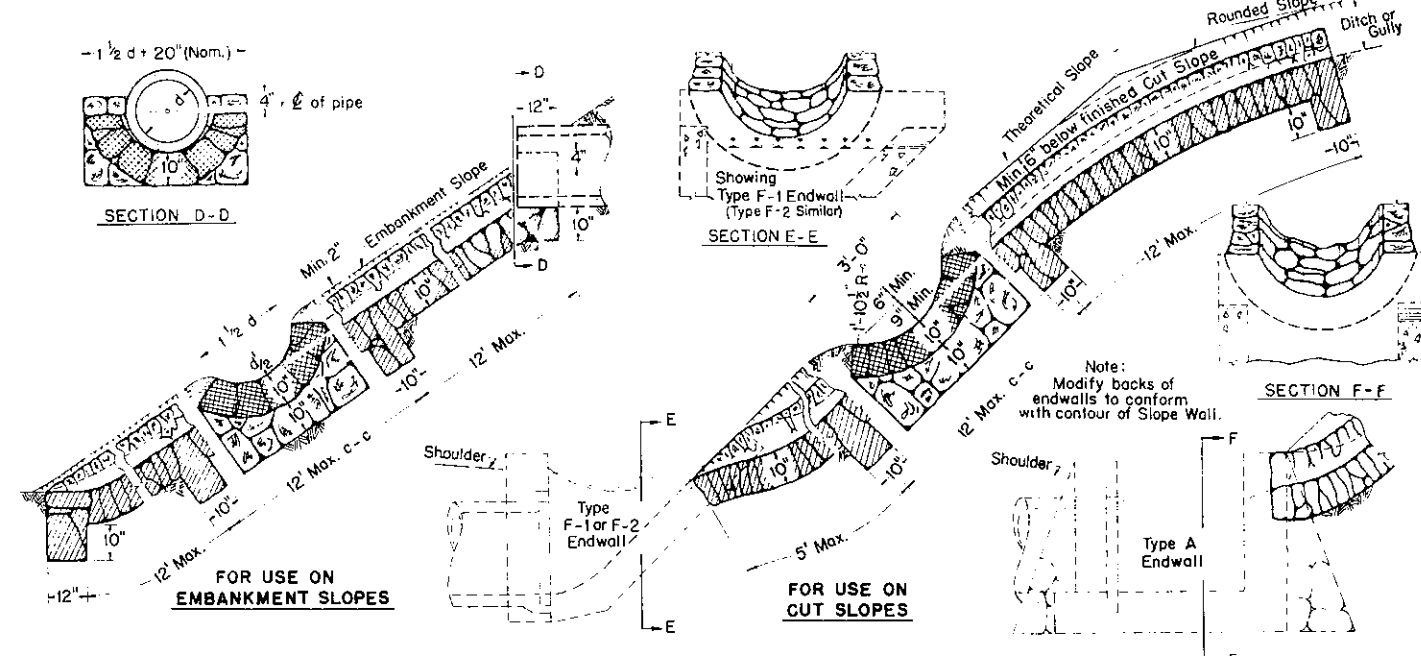
Revised to show one type of R.C.C. Curb.  
 Approved February 5, 1968  
 Chief Engineer  
 Revised to permit vertical face construction on P.C.C. Curb, P.C.C. Curb Gutters and Integral C.C. Curb.  
 Also corrected Vit Brick Gutter and C.C. Header Curb.  
 Approved March 3, 1954  
 Asst. Chief Engr. in Charge of Design

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF HIGHWAYS**  
**-STANDARD DETAILS-**  
**CURBS AND GUTTERS**  
 APPROVED March 24, 1947  
 Chief Engineer

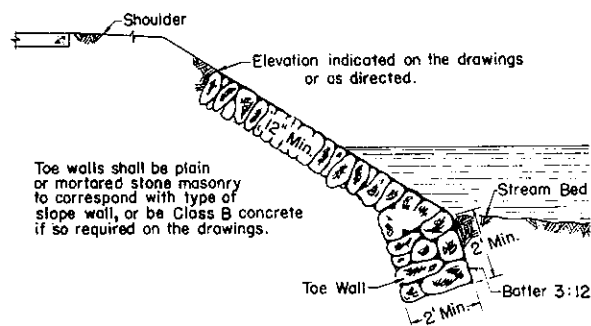
**SD-10**



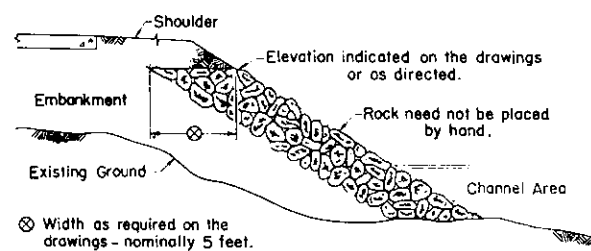
**CLASS B CEMENT CONCRETE SLOPE WALLS (FOR SPILLWAYS)**



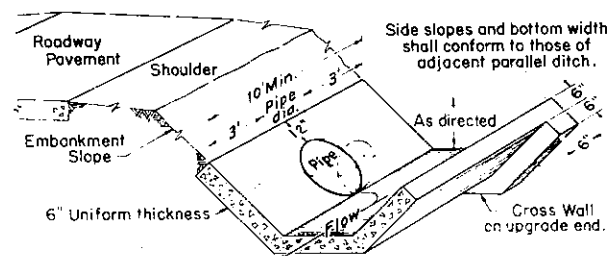
**MORTARED STONE SLOPE WALLS (FOR SPILLWAYS)**



**PLAIN AND MORTARED STONE SLOPE WALL**



**ROCK EMBANKMENT FOR SLOPE PROTECTION**



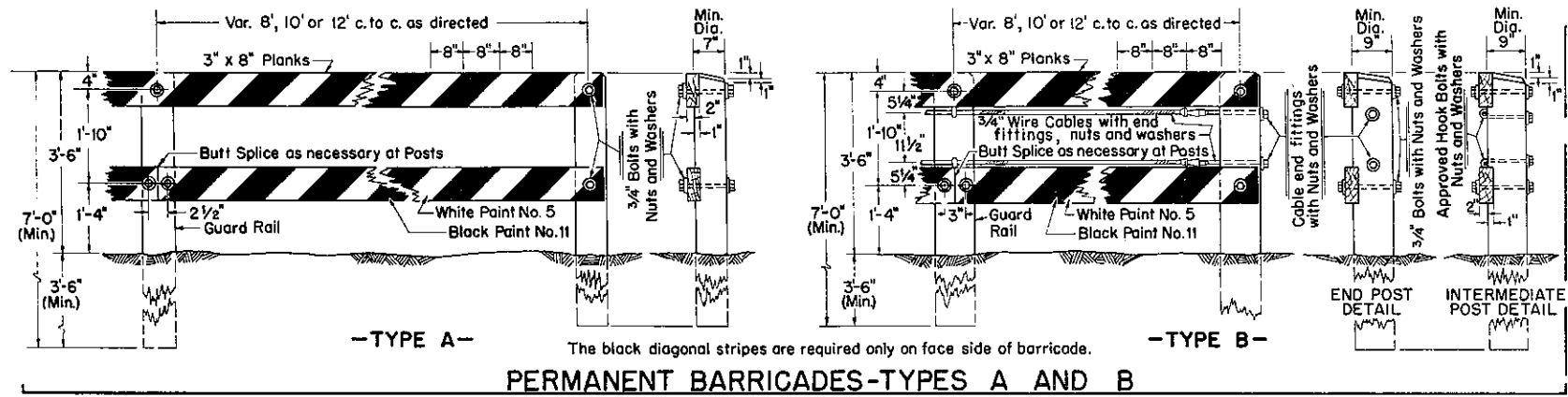
**CLASS B CEM. CONC. PAV'G. for STREAM BEDS (PAVED PARALLEL DITCH)**

Deleted details for "Class A & B Cement Concrete Slope Wall."  
 Approved April 4, 1969 *Wanchaiti*  
 CHIEF ENGINEER  
 Revised for nomenclature change from Guard Fence to Guard Rail.  
 Approved February 5, 1968 *Wanchaiti*  
 CHIEF ENGINEER  
 Revised for Bar Designation and for Slip-Dowel Size.  
 Approved November 1, 1961 *Wanchaiti*  
 CHIEF ENGINEER

**COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 —STANDARD DETAILS—  
 SLOPE PROTECTION**

APPROVED March 24, 1947  
*E. H. Schmidt*  
 CHIEF ENGINEER

**SD-11**

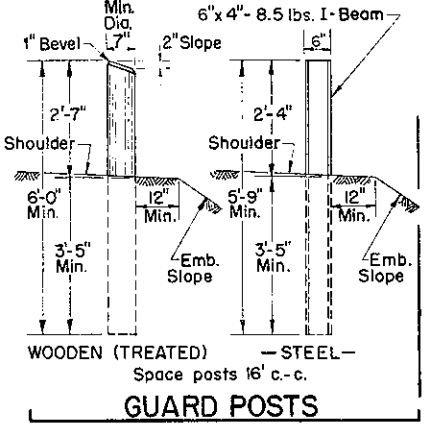


-TYPE A-

The black diagonal stripes are required only on face side of barricade.

-TYPE B-

PERMANENT BARRICADES-TYPES A AND B



|   |       |       |       |       |       |       |       |       |        |        |        |        |        |        |
|---|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| H   | 2'-0" | 3'-0" | 4'-0" | 5'-0" | 6'-0" | 7'-0" | 8'-0" | 9'-0" | 10'-0" | 11'-0" | 12'-0" | 13'-0" | 14'-0" | 15'-0" |
| -TYPE 1- SUSTAINING ROADWAY AND TWENTY (20) TON ROLLER- |       |       |       |       |       |       |       |       |        |        |        |        |        |        |
| B   | 2'-7" | 3'-1" | 3'-7" | 4'-1" | 4'-7" | 5'-1" | 5'-7" | 6'-1" | 6'-7"  | 7'-1"  | 7'-7"  | 8'-1"  | 8'-7"  | 9'-1"  |
| -TYPE 2- SUSTAINING SLOPING BANKS OF EARTH-             |       |       |       |       |       |       |       |       |        |        |        |        |        |        |
| B   | 2'-2" | 2'-5" | 2'-8" | 3'-2" | 3'-5" | 3'-8" | 4'-2" | 4'-5" | 4'-8"  | 5'-2"  | 5'-5"  | 5'-8"  | 6'-2"  | 6'-5"  |
| -TYPE 3- SUSTAINING LEVEL BANKS OF EARTH-               |       |       |       |       |       |       |       |       |        |        |        |        |        |        |
| B   | 2'-2" | 2'-3" | 2'-5" | 2'-8" | 3'-1" | 3'-5" | 3'-8" | 4'-0" | 4'-5"  | 4'-11" | 5'-5"  | 5'-10" | 6'-4"  | 6'-9"  |

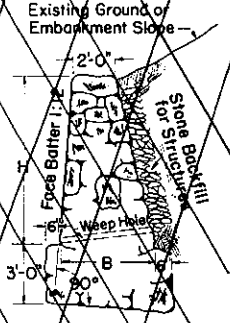
Masonry courses in wall and footing shall be perpendicular to the face batter and shall be laid so that no course will be continuous through thickness of wall.

Footers shall have a minimum depth of three (3) feet except where rock is encountered.

Weep holes shall be placed when and as directed by the Engineer.

Stone backfill shall be placed when specified on the construction drawings for the project.

CEMENT RUBBLE MASONRY RETAINING WALLS



Revised to delete Cement Rubble Masonry Retaining Walls

Approved February 5, 1948

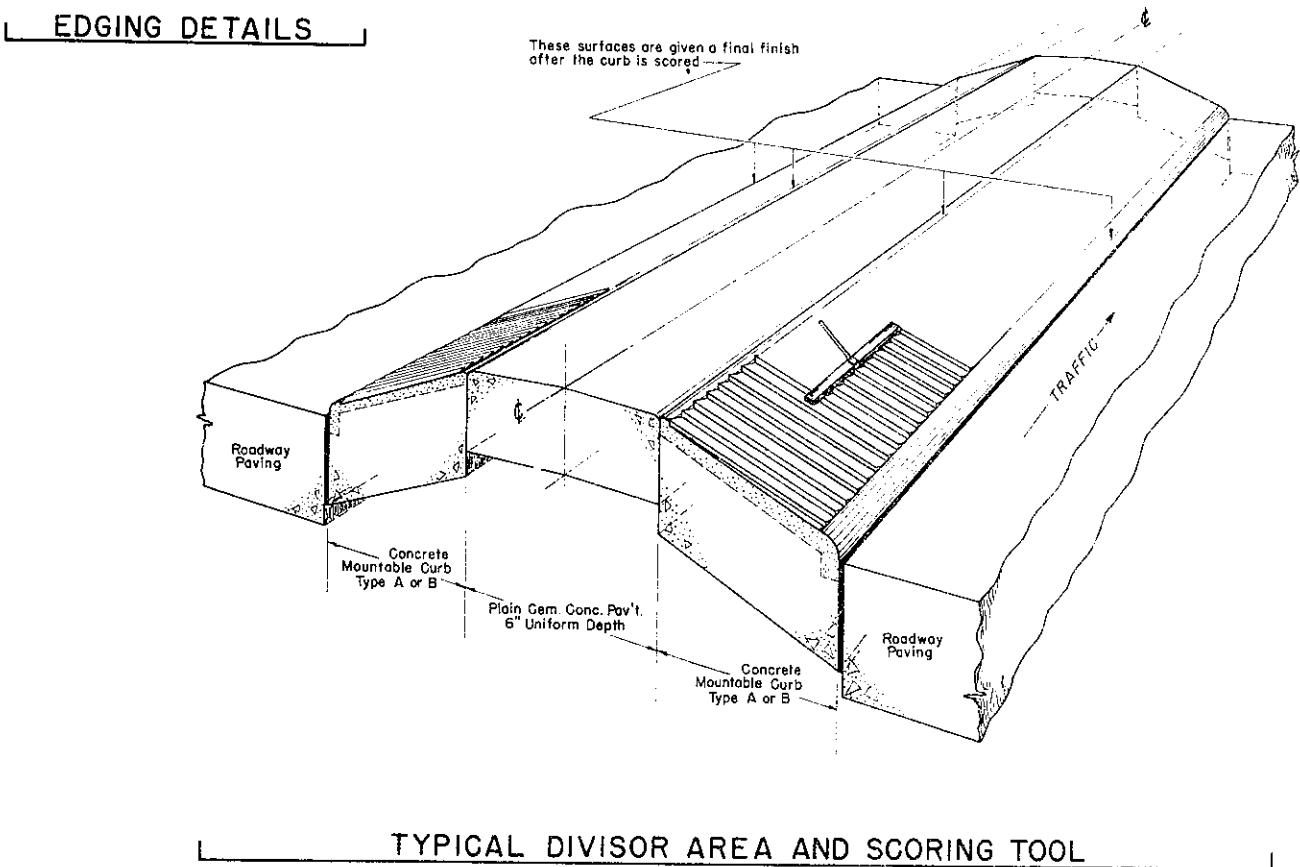
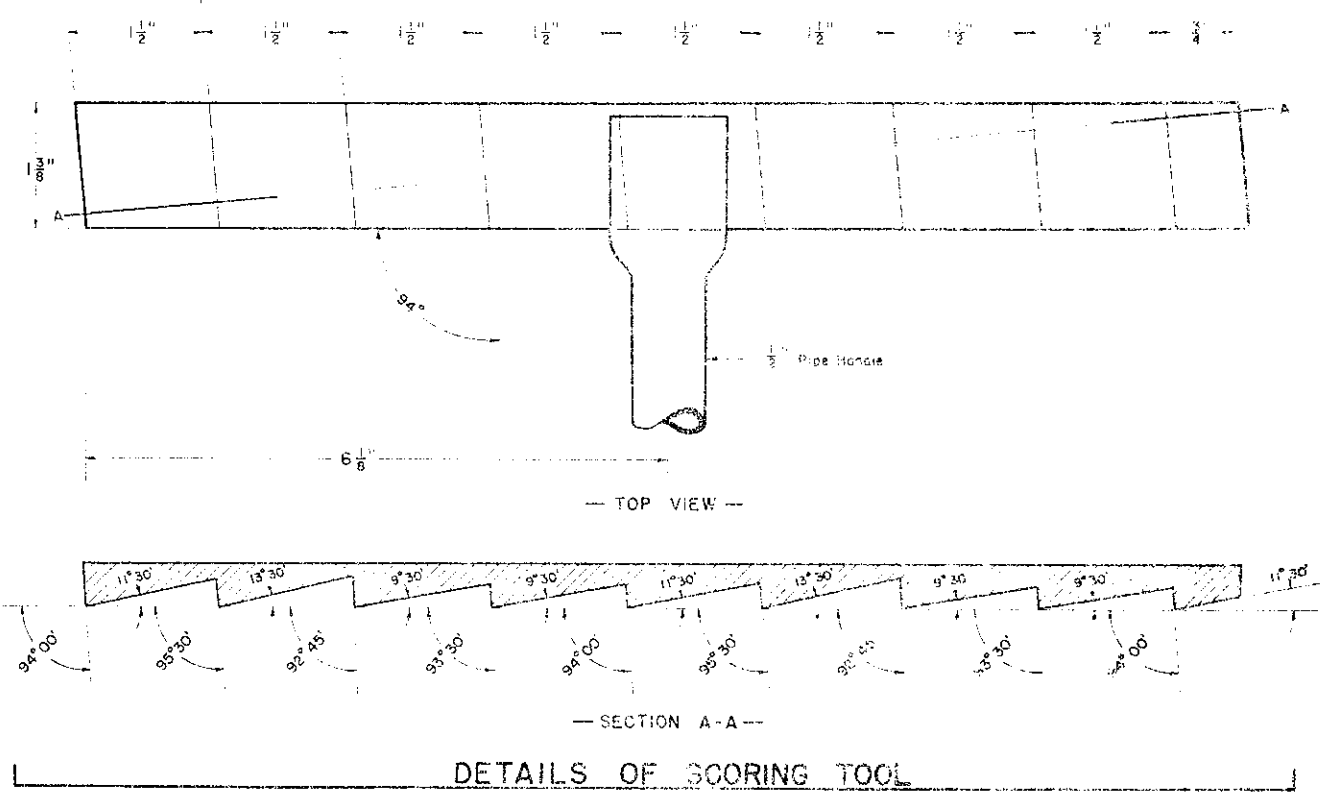
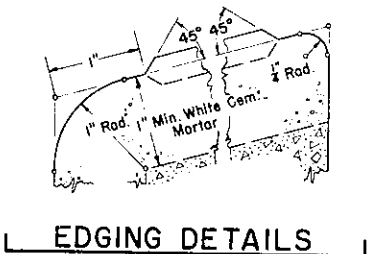
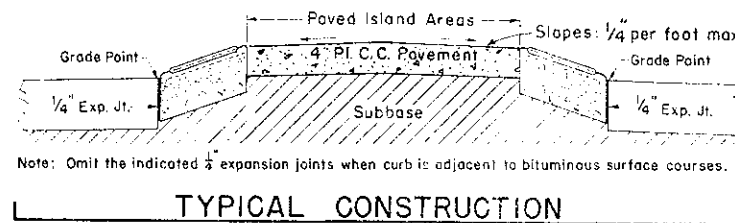
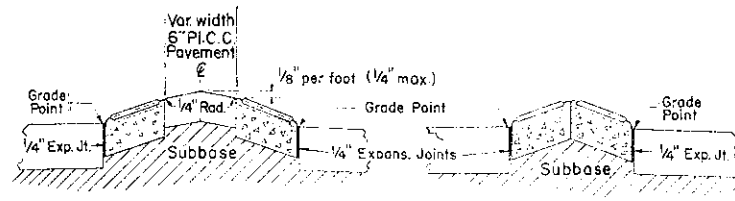
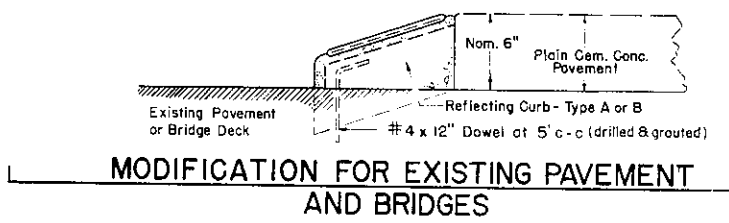
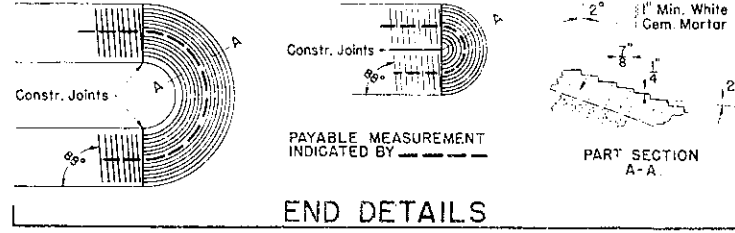
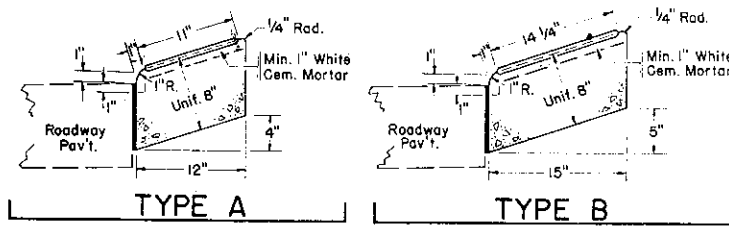
Approved November 1, 1961

Approved July 24, 1956

Revised for Guard Post Painting Approved August 25, 1953

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
-STANDARD DETAILS-  
MISCELLANEOUS  
APPROVED March 24, 1947  
CHIEF ENGINEER

SD-12



**TABULATION OF MOUNTABLE CURBS**

| TYPE OF CURB  | DESIGN DETAILS   |
|---|--|
| White Concrete Mountable Reflecting Curb, Types A & B | As shown in sketches.  |
| Plain Concrete Mountable Reflecting Curb, Types A & B | As shown in sketches, except replace white cement mortar with plain cement mortar. |
| Plain Concrete Mountable Curb, Types A & B            | As shown in sketch, except plain cement mortar and scoring.                        |

Revised to add alternate scoring tool on sheet 2.  
 Approved December 19, 1969 *David C. Lima* DEPUTY CHIEF ENGINEER

Premolded Expansion Joint Material changed to Premolded Expansion Joint filler. (Sheet 2 of 2)  
 Approved February 21, 1968 *W. M. Quilley* CHIEF ENGINEER

Revised Modification Detail and Plain Concrete Mountable Curb Design Detail note.  
 Approved Oct. 31, 1966 *S. G. ...* ASSISTANT CHIEF ENGINEER - DESIGN

Revised for name of drawing, added tabulation of types, and sheet 2.  
 Approved May 13, 1966 *S. G. ...* ASSISTANT CHIEF ENGINEER - DESIGN

Revised for dowel bar size designation.  
 Approved November 1, 1961 *...* CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS

**CONCRETE MOUNTABLE CURBS  
 TYPES A & B**

APPROVED *May 7, 1948* 1948 SHEET 1 OF 2  
*...* CHIEF ENGINEER

**SD-13**



**NOTES**

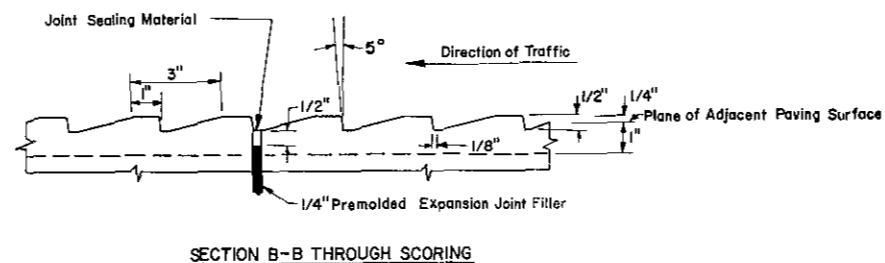
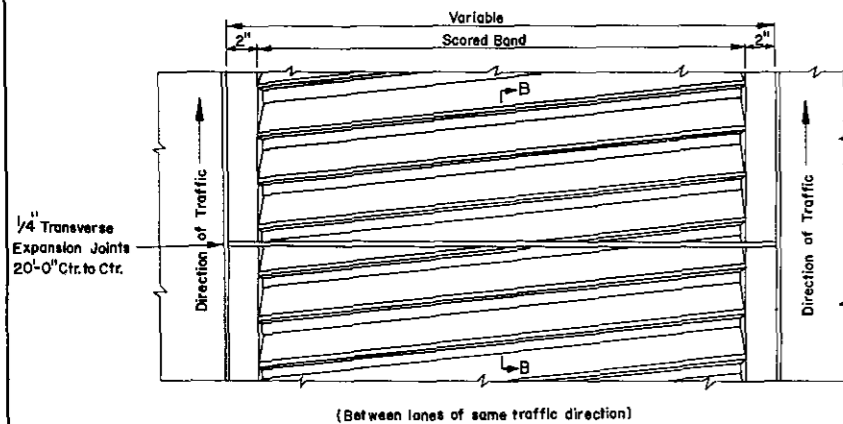
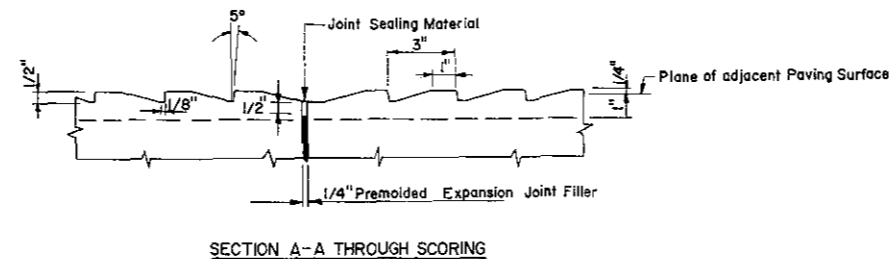
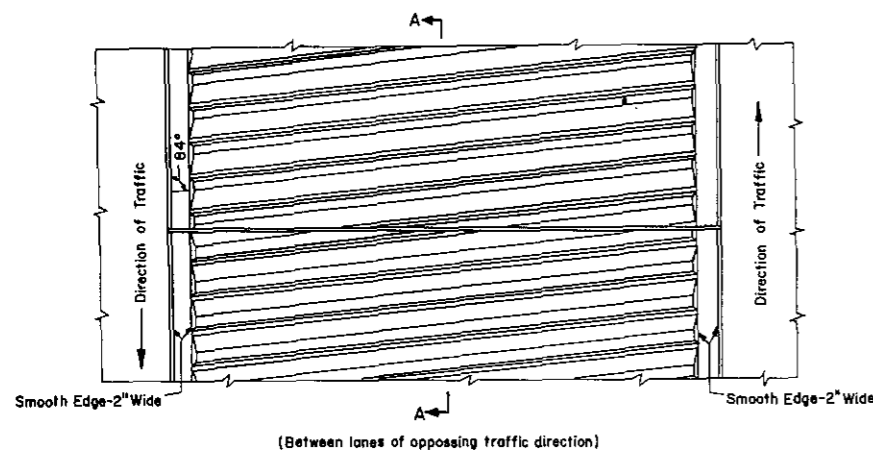
The scoring operation shall be done twice. The first scoring shall be done immediately after the mortar surface has been screeded and smoothed to the proper grade. The second scoring operation shall be done after the excess water has disappeared from the surface and the mortar has acquired sufficient stiffness to remain in place without slumping. All surfaces of the scored band shall be smooth, with true inclinations and draft. All corners shall be sharp. The edging on each side of the scored band shall be smooth, true to grade and alignment and shall be free from an excess of mortar at its junction with the scored band.

Transverse Expansion Joints of corresponding thickness shall be placed directly opposite those in the adjacent pavement. Also 1/4" expansion joints shall be placed in line with construction joint in the adjacent concrete pavement and at intermediate intervals of approximately 20 feet.

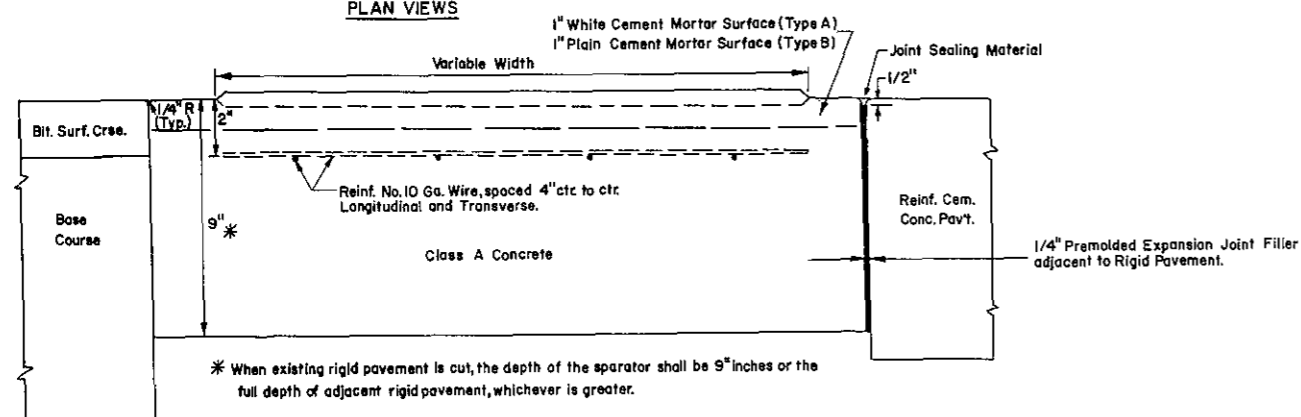
Concrete Traffic Separator, Type A shall be used in areas not artificially lighted.

Concrete Traffic Separator, Type B shall be used in areas artificially lighted.

At the option of the contractor, either type scoring tool may be used when scoring between lanes of opposing traffic.

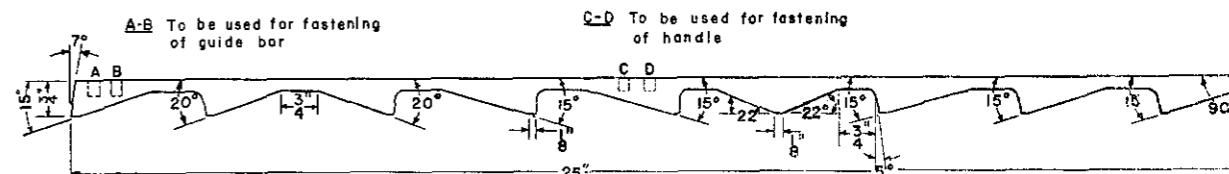
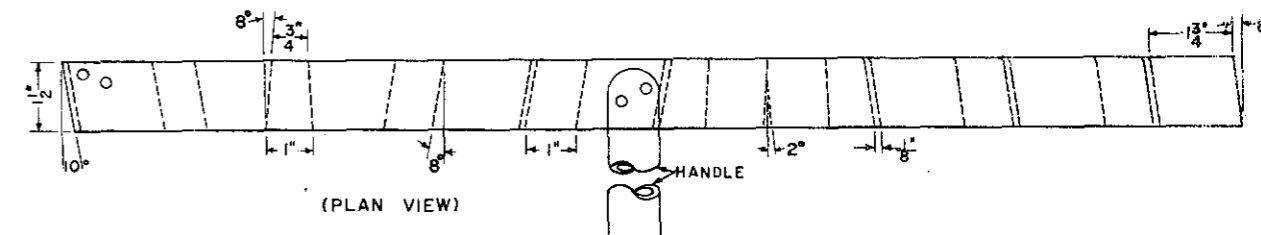


**PLAN VIEWS**

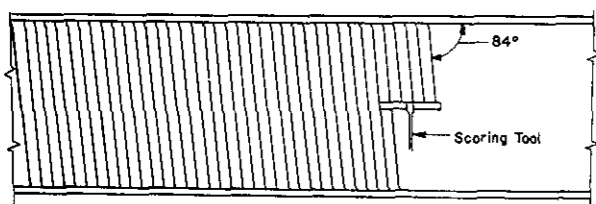


\* When existing rigid pavement is cut, the depth of the separator shall be 9 inches or the full depth of adjacent rigid pavement, whichever is greater.

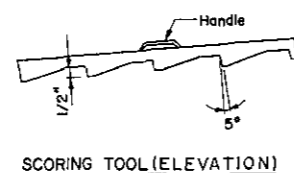
**TYPICAL CROSS SECTION**



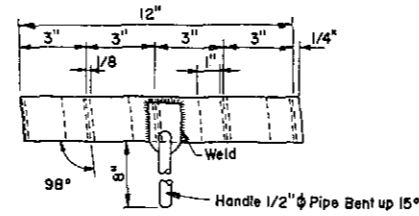
Alternate Scoring Tool For Scoring Between Lanes of Opposing Traffic. (ELEVATION VIEW)



PLAN OF SCORING



SCORING TOOL (ELEVATION)



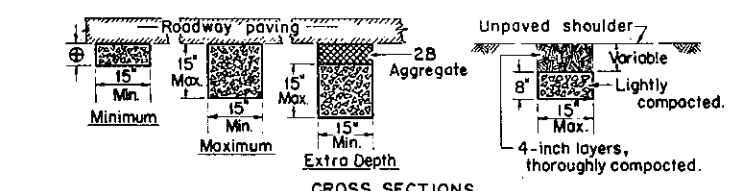
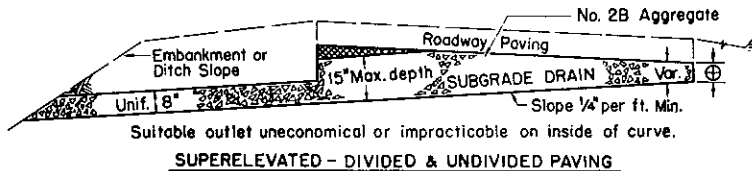
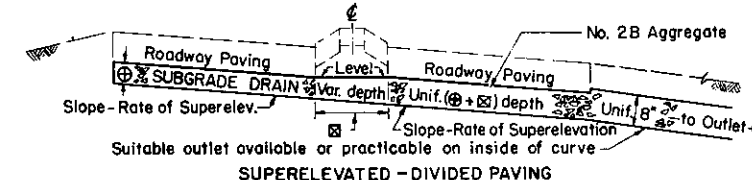
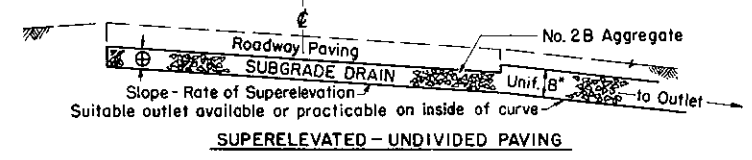
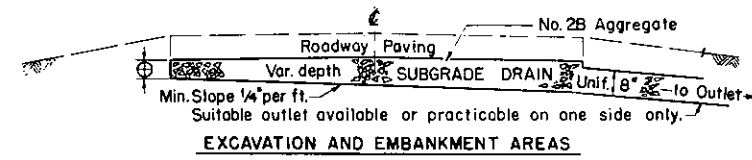
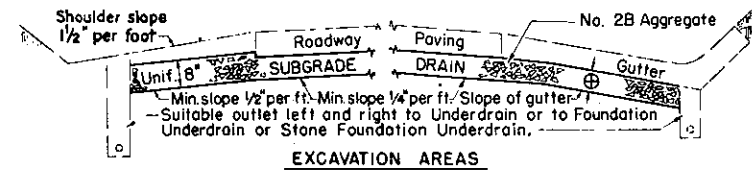
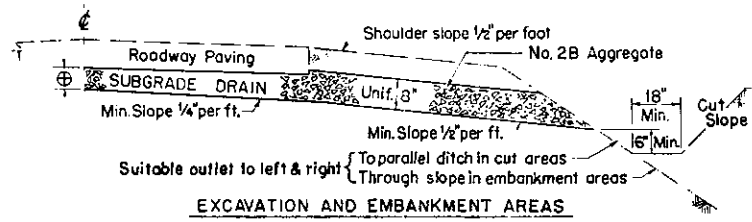
SCORING TOOL (PLAN VIEW)

**CONCRETE TRAFFIC SEPARATOR  
TYPE A & B**

SHEET 2 OF 2

12/19/69  
February 5, 1968

**SD-13**



- ⊕ - Six (6) inches minimum depth of adjacent insulation material or Sub-base.
- ⊞ - Aggregate in excess of 15-inch depth is payable as 2B Coarse Aggregate.
- ⊟ - Excavation in excess of 15-inch depth is payable as Class 2 Excavation.
- ⊠ - One quarter (1/4) inch per foot for the width of divisor area.

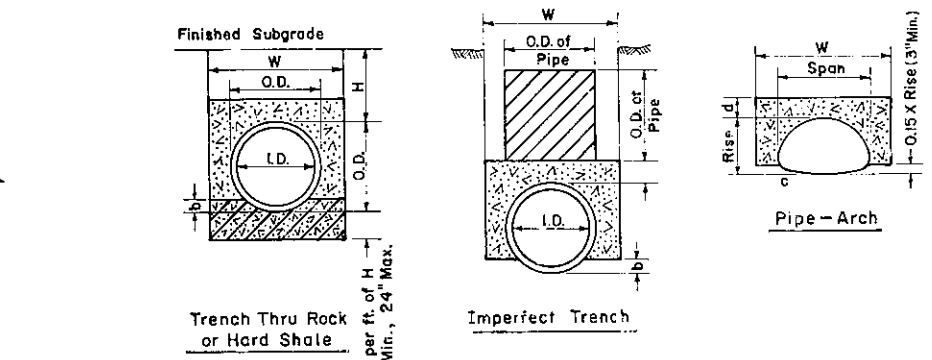
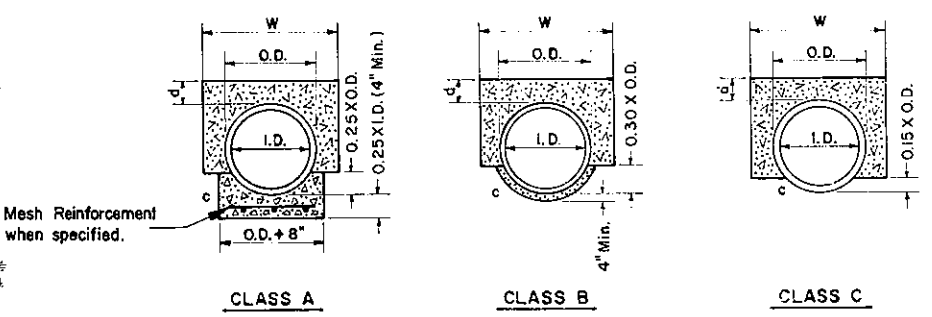
The top of aggregate under concrete pavement, base or gutter and through the unpaved shoulder area shall be covered with either one (1) layer of approved Bit. paper or one (1) layer of subgrade paper (A.A.S.H.O. M74) twenty-four (24) inches in width.

Under Rigid Type Base Courses where Sub-base is not specified either on the drawings or in the Proposal Subgrade Drains shall be placed on the upper side of all transverse construction joints and as herein specified for flexible type base courses.

Under Reinforced Cement Concrete Pavements where Sub-base is not specified either on the drawings or in the Proposal: Subgrade Drains shall be placed on the upper side of all transverse expansion and construction joints and at low points of grade. They shall be skewed one (1) foot per traffic lane and the nearest point of the drain shall be two (2) feet from the transverse joint.

Under Flexible Type Base Courses: Subgrade Drains shall be placed at low points of grade, at transitions between excavation and embankment areas, and where directed by the Engineer.

**SUBGRADE DRAINS**



**PIPE BEDDING AND BACKFILL**

- ⊞ COARSE AGGREGATE
- ⊟ CONCRETE
- ⊠ FINE AGGREGATE
- ⊡ SELECTED FINE COMPRESSIBLE MATERIAL or when directed
- ⊢ COARSE AGGREGATE
- ⊣ LOOSE, HIGHLY COMPRESSIBLE EARTH or other APPROVED MATERIAL

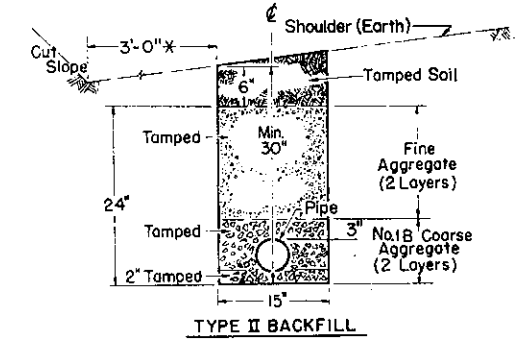
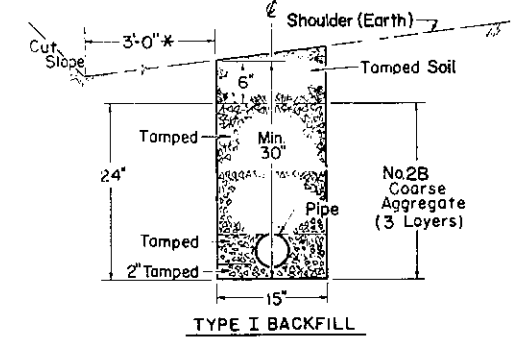
- I.D. - Nominal inside diameter of pipe.
- O.D. - Outside diameter of pipe barrel or shell.
- H.D. (Hub Diameter) - Outside diameter of pipe at bell or band.
- W - 2.0 ft. + H.D. for pipes or pipe-arches not exceeding 48" I.D. or Span, respectively.
- 2.5 ft. + H.D. for pipes or pipe-arches exceeding 48" I.D. or Span, respectively.
- b - Varies in conformance with class of bedding applicable to pipe installation.
- c - When unstable material under the pipe has been removed, it shall be replaced with suitable material compacted to a satisfactory density, and the bed shaped as specified in Section 601.3
- d - 1.0 ft. minimum, where practicable.
- H - Height of fill over top of pipe.

Note: The use of Coarse Aggregate for pipe backfill will be based upon the location and type of pipe installation. The material and method of backfill shall be in accordance with Section 601.3(d) except as noted, it will be used for all pipes carrying surface drainage located within the limits bounded by the outer edges of shoulders in cut sections, or by the toes of slopes in embankment sections.

- The exceptions are:
- (1) Pipes located in medians.
  - (2) Pipes located under swales or ditch lines.
  - (3) Slope pipes in cut or fill.
  - (4) Pipes under drives to private properties.
  - (5) Combination storm sewer and underdrain.
  - (6) Pipes located in graded sections of interchange areas.
- For calculating quantities of coarse aggregate, deduct volume occupied by pipe.

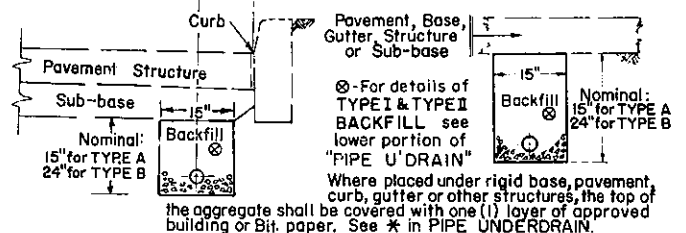
**PIPE CULVERTS & CORR. METAL PIPE-ARCH CULVERTS**

Revised in accordance with Form 408/1967  
Approved February 5, 1968  
Revised for location of Pipe Foundation Underdrain Types A & B  
Approved NOVEMBER 2, 1966  
Revised for the change in minimum diameter of slope pipes on Shee. 2.  
Approved April 12, 1966

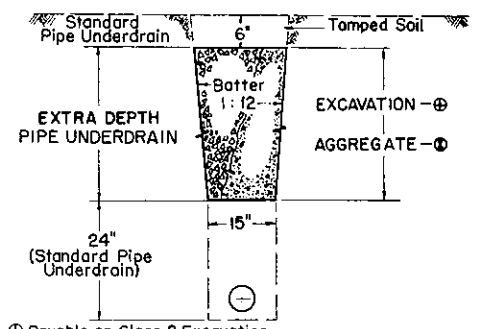


\* Unless otherwise indicated on the drawings. Also required for Pipe Foundation Underdrain, when used to drain Sub-base.

**PIPE UNDERDRAIN-TYPES I & II BACKFILL**

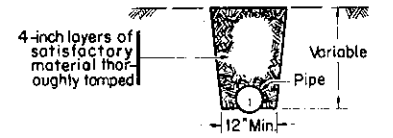


**PIPE FOUNDATION UNDERDRAIN TYPES A & B, TYPES I & II BACKFILL**



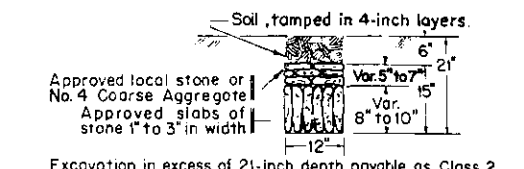
⊕ Payable as Class 2 Excavation.  
⊞ No. 2B coarse aggregate used over Pipe Underdrain-Type I Backfill is payable as Coarse Aggregate for Extra Depth Underdrain.  
⊟ Fine aggregate used over Pipe Underdrain-Type II Backfill is payable as Fine Aggregate for Extra Depth Underdrain.

**EXTRA DEPTH PIPE UNDERDRAIN**

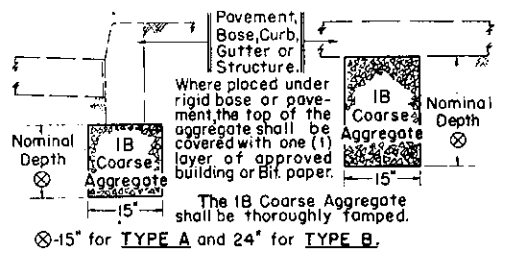


Excavation over 36 inches in depth and for a maximum width of 24 inches is payable as Class 2 Excavation.

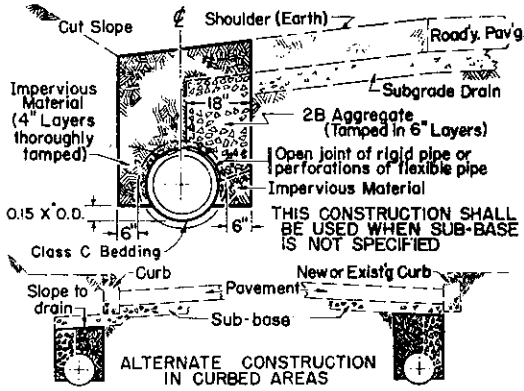
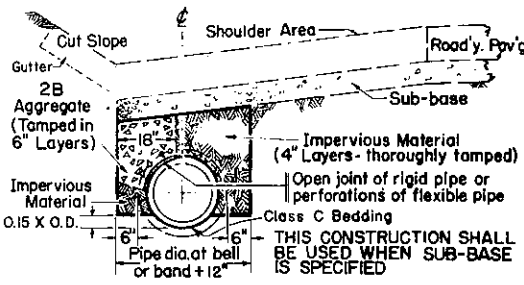
**PIPE UNDERDRAIN OUTLETS**



Excavation in excess of 21-inch depth payable as Class 2.



**STONE FOUNDATION UNDERDRAIN TYPES A & B**

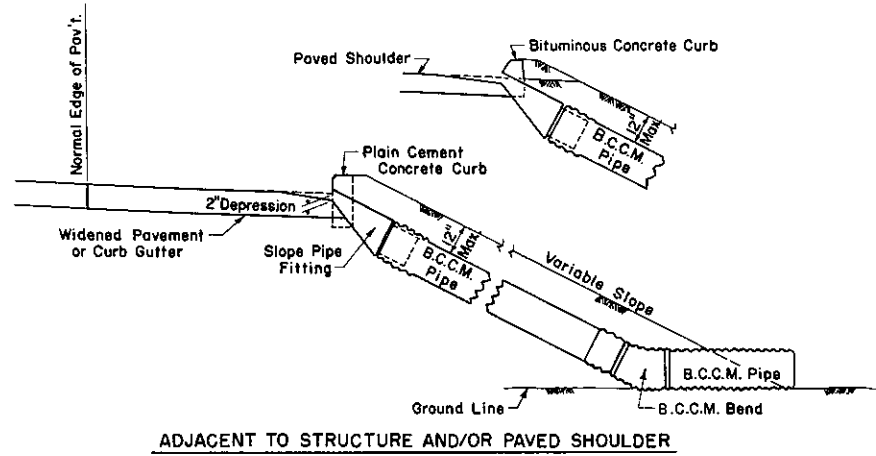


Aggregate - 2B: On cu. yd. basis - Compacted & complete in place.  
Excavation - Class 2: Width - outside dia. of pipe at bell or band + 1 foot.

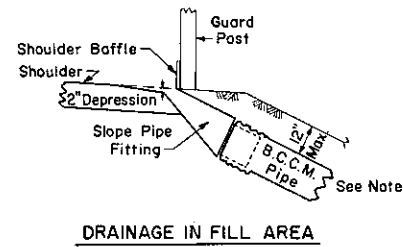
**COMBINATION STORM SEWER & U'DRAIN**

Revised to include Pipe Culvert and C.M. Pipe-Arch Bedding and Backfill, and to delete references to Special Subgrade; also the addition of Sheet 2.  
Approved November 12, 1966  
Revised to conform to SPECIFICATIONS, Form 408 dated 1960.  
Approved November 1, 1961

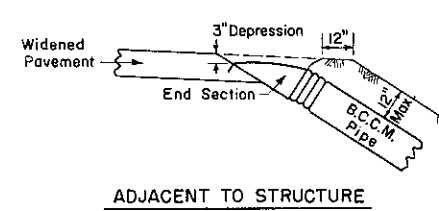
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
- STANDARD DETAILS -  
SUB-SURFACE DRAINS  
APPROVED October 12, 1950  
SHEET 1 OF 2  
SD-14



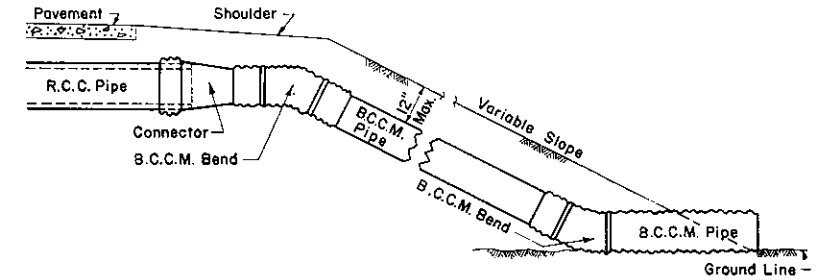
ADJACENT TO STRUCTURE AND/OR PAVED SHOULDER



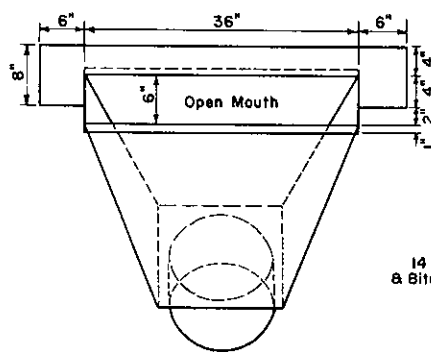
DRAINAGE IN FILL AREA



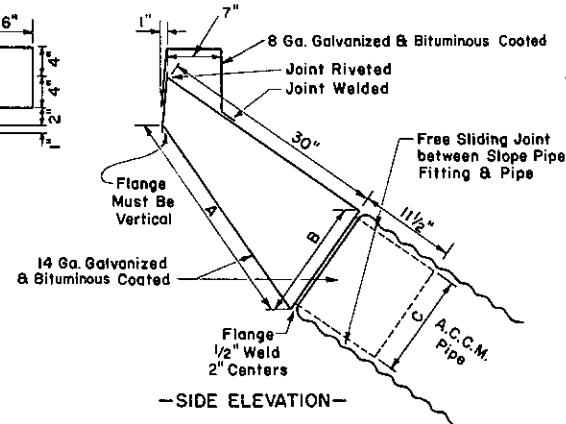
ADJACENT TO STRUCTURE



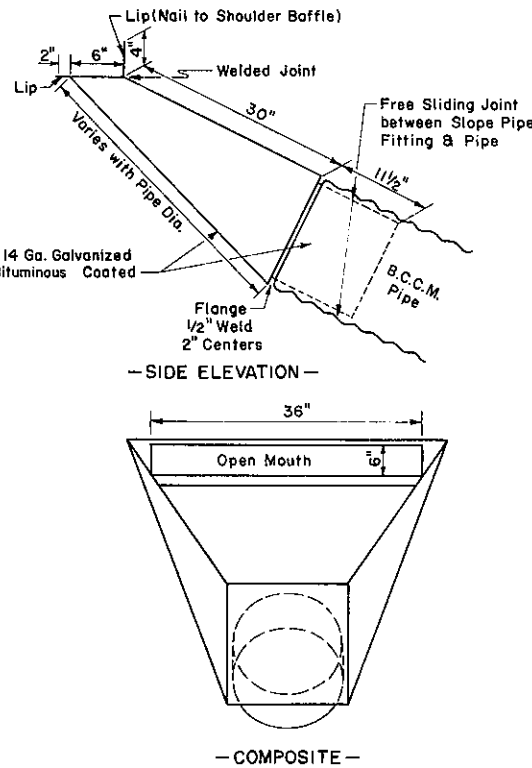
OUTLET PIPE THRU EMBANKMENT SLOPE



-FRONT ELEVATION-

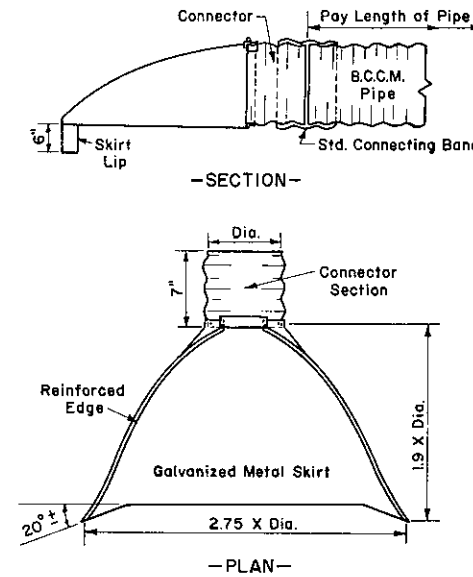


-SIDE ELEVATION-



-SIDE ELEVATION-

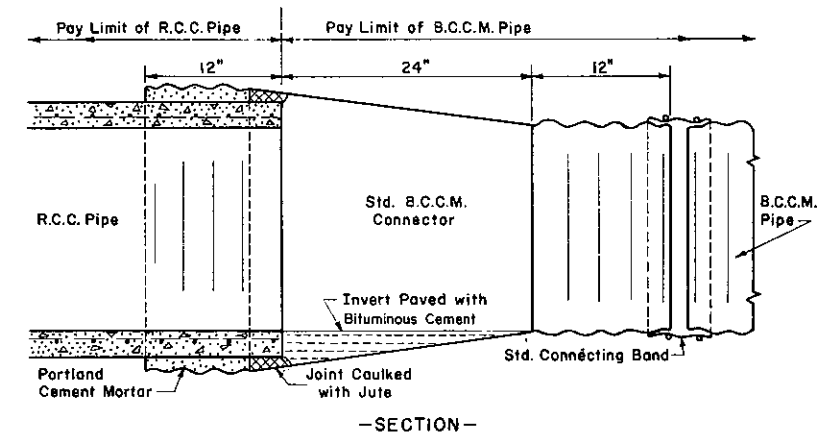
-COMPOSITE-



-SECTION-

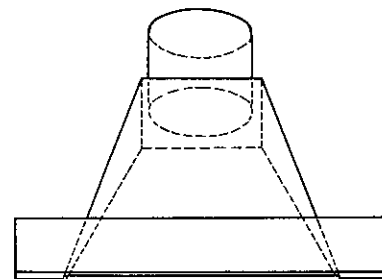
-PLAN-

END SECTION



-SECTION-

BITUMINOUS COATED CORRUGATED METAL PIPE CONNECTOR



-PLAN-

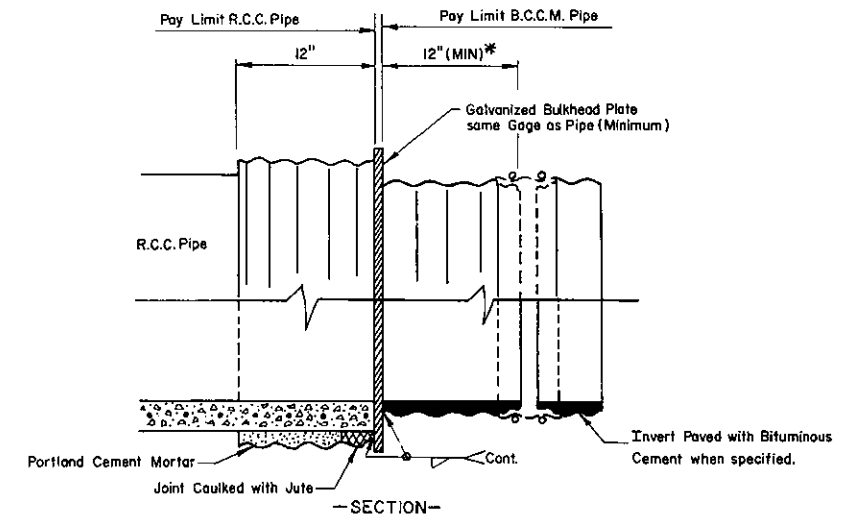
SLOPE PIPE FITTING - TYPE A

| Nominal Diameter of Pipe* | Dimensions (Inches) for 2:1 Slopes |    |    |
|---------------------------|------------------------------------|----|----|
|                           | A                                  | B  | C  |
| 12"                       | 28 <sup>9</sup> / <sub>16</sub>    | 13 | 11 |
| 15"                       | 29 <sup>13</sup> / <sub>16</sub>   | 16 | 14 |

\* See Note

SLOPE PIPE FITTING - TYPE B

Note: Slope pipes draining only shoulder areas in embankments, other than those adjacent to structures, shall be restricted to 12" in diameter (Minimum)



-SECTION-

ALTERNATE BITUMINOUS COATED CORRUGATED METAL PIPE CONNECTOR

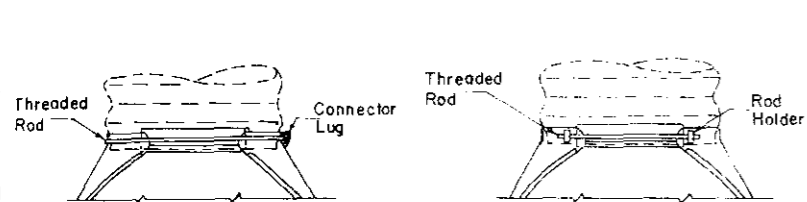
\* Adjust Length to obtain even 2 ft. Lengths of Connecting Pipe.

February 5, 1948  
Eng. Dept. - 10, Inc.

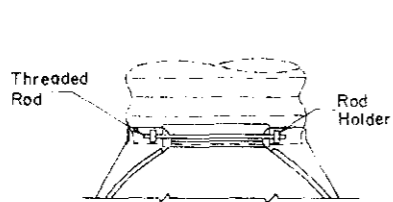
SUB-SURFACE DRAINS

SHEET 2 OF 2

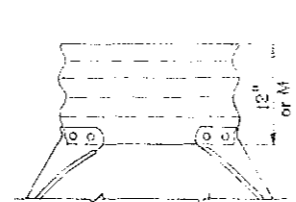
SD-14



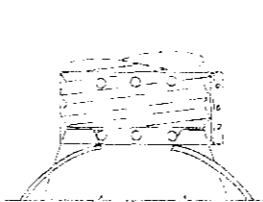
**TYPE-1 CONNECTION**  
 Sizes: 18"-24" Circular Pipe



**TYPE-2 CONNECTION**  
 Sizes: 30"-36" Circular Pipe & 16"x11" to 58"x36" Pipe-Arch

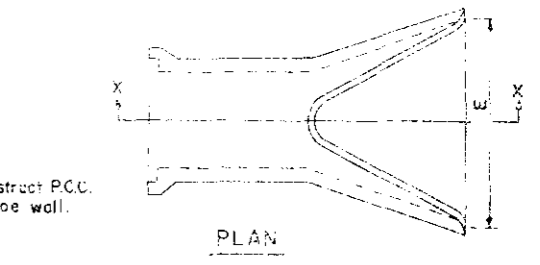
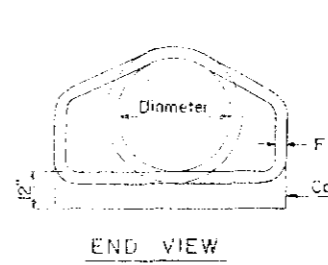
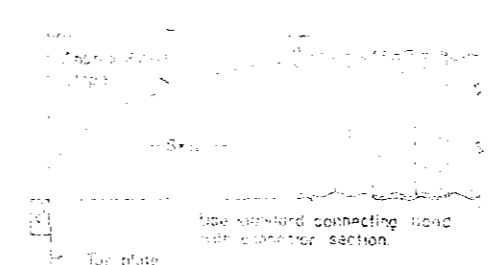
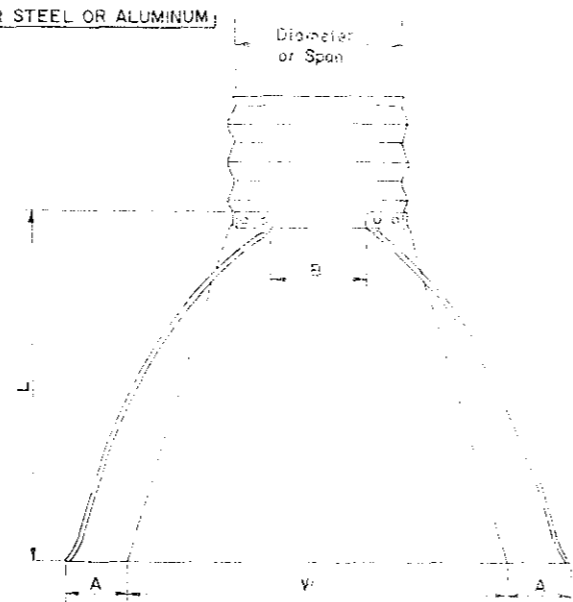
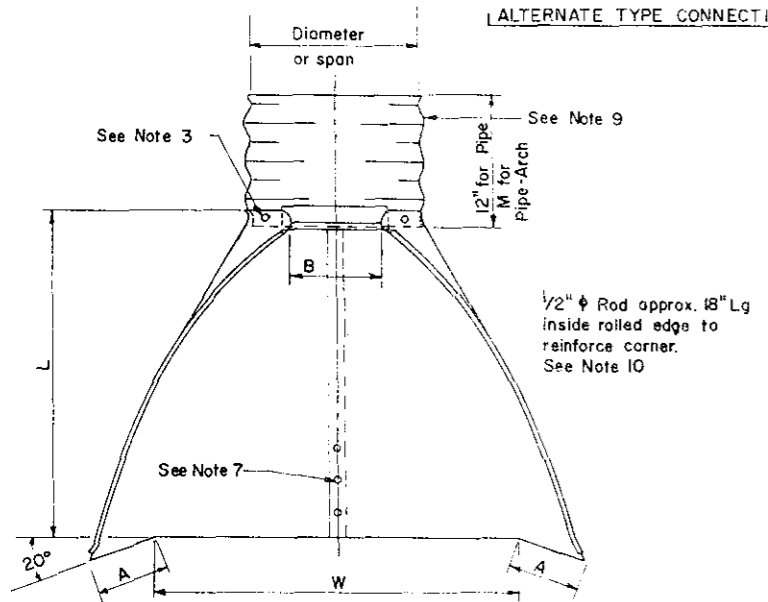


**TYPE-3 CONNECTION**  
 Sizes: 42" & Greater Circular Pipe & 65"x40" to 85"x54" Pipe-Arch

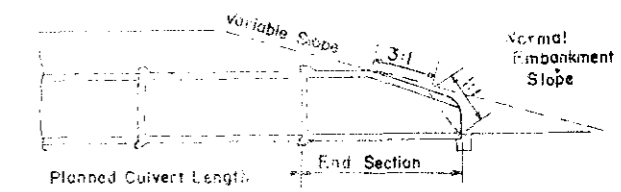
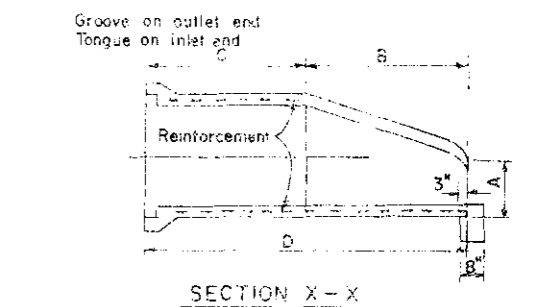


**TYPE-D CONNECTION**  
 Sizes: 18"-36" Circular Pipe & 18"x11" to 58"x36" Pipe Arch.

**ALTERNATE TYPE CONNECTIONS FOR STEEL OR ALUMINUM**



- NOTES FOR STEEL END SECTIONS**
1. All 3-pc bodies shall be 10 Ga. center panels. Width of center panels to be greater than 10% of the pipe's periphery. Multiple panel bodies to have top seams which are to be tightly sealed by 3/8" φ galvanized rivets or bolts.
  2. Reinforcement shall be placed perpendicular with galvanized stiffener angles for the 60" thru 84" circular pipe, 18" and 48" pipe arch sides. The angles will be 2"x2"x1/4" for 60" thru 72" circular pipe, 24" and 60" pipe arch sizes and 2 1/2"x2 1/2"x1/4" for 78" and 84" circular pipe. The angles to be attached by 3/8" φ galvanized nut and bolts.
  3. Angle reinforcement shall be placed under the center panel seams on the 79"x49" and 85"x54" pipe arch sizes.
  4. Galvanized toe plates to be placed on all end sections.
  5. The Type D connection shall be used in curved end sections to pipe which have other than standard connections. It is desirable when practicable provided no leakage results from the connection.

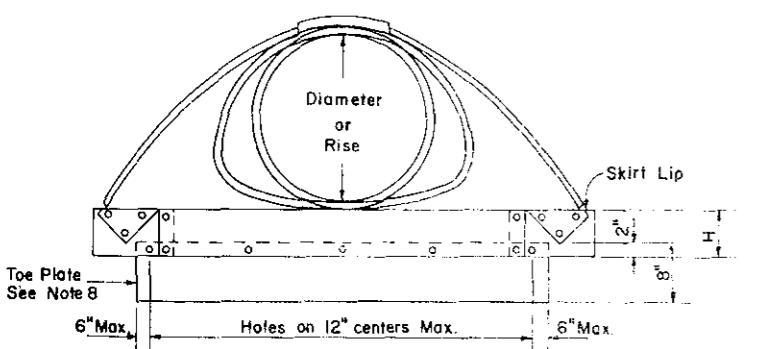


- NOTES FOR ALUMINUM ALLOY END SECTION**
1. Skin shall be made from aluminum alloy 3004-O, clad 5% each side with clay 7072.
  2. Skirt, toe plate and toe plate shall be the same material and gage as skirt.
  3. Rivets shall be aluminum alloy 5052-14.
  4. Threaded rods shall be aluminum alloy 6061-T6.
  5. Connector lug bolts, if used, shall be hot-dipped galvanized steel.
  6. Skirt for pipe arch shall be 10 ga. for spans 18" to 36" and for pipe arch shall be 10 ga. for spans 48" to 58" and for pipe arch shall be 10 ga. for spans 60" and 72" shall be made from 10 ga. (3) sheets. Provide 2 top seams fastened with 3/8" φ rivets on center line spaced 5'-0".
  7. The pipe shall be fastened to the material and gage as skirt. Locate punched holes to match holes in skirt. Provide 2 1/2" bolts and nuts for assembly.
  8. Pipe Arch end section shall be attached to Toe Plate - Pipe size - Length Toe Plate: 18"-30" - W+10", 36"-48" - W+22".
  9. Connector sections, when specified, shall be constructed aluminum alloy pipe.
  10. Reinforcement for edge of skirt shall be alloy 5063-F.

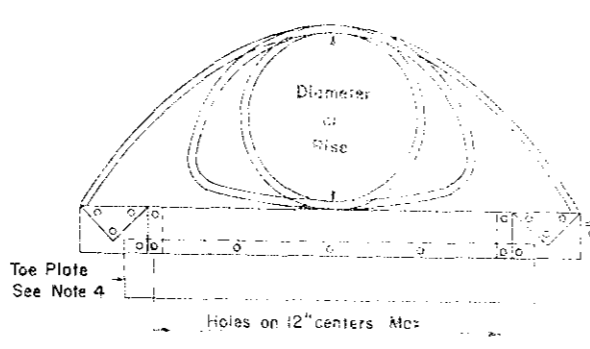
**CONCRETE END SECTION**

| Diam" | A"     | B"         | C"         | D"         | E"    | F"     |
|-------|--------|------------|------------|------------|-------|--------|
| 18    | 9"     | 2'-3"      | 3'-10"     | 5'-1"      | 3'-0" | 2 1/2" |
| 21    | 9      | 2'-11"     | 3'-2"      | 6'-1"      | 3'-6" | 2 3/4" |
| 24    | 9 1/2  | 3'-7 1/2"  | 2'-6"      | 6'-1 1/2"  | 4'-0" | 3"     |
| 27    | 10 1/2 | 4'-0"      | 2'-1 1/2"  | 5'-1 1/2"  | 4'-6" | 3 1/4" |
| 30    | 12     | 4'-6"      | 1'-7 3/4"  | 6'-3 3/4"  | 5'-0" | 3 1/2" |
| 33    | 13 1/2 | 4'-10 1/2" | 3'-3 3/4"  | 8'-3 3/4"  | 5'-6" | 3 3/4" |
| 36    | 15     | 5'-3"      | 2'-10 3/4" | 8'-13 1/4" | 6'-0" | 4"     |
| 42    | 21     | 5'-3"      | 2'-11"     | 8'-2"      | 6'-6" | 4 1/2" |
| 48    | 24     | 6'-0"      | 2'-2"      | 8'-2"      | 7'-0" | 5"     |
| 54    | 27     | 6'-5"      | 2'-11"     | 8'-4"      | 7'-6" | 5 1/2" |

- GENERAL NOTES**
1. End section shall be of the same material as the pipe or pipe arch culvert to which it is attached.
  2. End sections for aluminum alloy or steel pipe, with a diameter larger than 54", used on the inlet end of a pipe culvert, shall be anchored. Details of the anchor shall be shown on the drawings.



**ALUMINUM ALLOY END SECTION**



**STEEL END SECTIONS**

**DIMENSIONS OF END SECTIONS FOR ALUMINUM ALLOY PIPE**

| Pipe Diam. in Inches | Gage | A ±1" | B Max. | H ±1"  | L ±1/2" | W ±2" |
|----------------------|------|-------|--------|--------|---------|-------|
| 18                   | 16   | 7     | 9      | 6      | 31      | 36    |
| 21                   | 16   | 8 1/4 | 11     | 6      | 36      | 42    |
| 24                   | 14   | 9 1/2 | 12     | 6      | 42      | 48    |
| 30                   | 14   | 12    | 15     | 7 1/2  | 52 1/2  | 60    |
| 36                   | 12   | 14    | 18     | 9      | 63      | 72    |
| 42                   | 12   | 16    | 21     | 10 1/2 | 73 1/2  | 84    |
| 48                   | 12   | 18    | 27     | 12     | 84      | 90    |

**DIMENSIONS OF END SECTIONS FOR ALUMINUM ALLOY PIPE-ARCH**

| Pipe Arch in Inches | Span | Rise | Gage   | A ±1"  | B Max. | H ±1" | L ±1/2" | W ±2" | M  |
|---------------------|------|------|--------|--------|--------|-------|---------|-------|----|
| 18                  | 11   | 16   | 16     | 4 1/2  | 9      | 6     | 19      | 30    | 12 |
| 22                  | 13   | 16   | 5 1/4  | 10     | 6      | 6     | 23      | 36    | 12 |
| 25                  | 16   | 16   | 6 1/4  | 11 1/2 | 6      | 6     | 28      | 42    | 12 |
| 29                  | 18   | 14   | 7      | 14     | 6      | 6     | 31 1/2  | 48    | 12 |
| 36                  | 22   | 14   | 8 3/4  | 16     | 6      | 6     | 38 1/2  | 60    | 12 |
| 43                  | 27   | 12   | 10 3/4 | 17 1/2 | 7 5/8  | 47    | 75      | 75    | 12 |
| 50                  | 31   | 12   | 12 1/4 | 20     | 9 1/8  | 54    | 85      | 85    | 12 |
| 58                  | 36   | 12   | 14     | 26     | 10 5/8 | 63    | 96      | 96    | 12 |
| 65                  | 40   | 12   | 15 3/4 | 23     | 10 5/8 | 70    | 112     | 112   | 24 |
| 72                  | 44   | 10   | 17 1/4 | 24     | 12 1/8 | 77    | 128     | 128   | 24 |

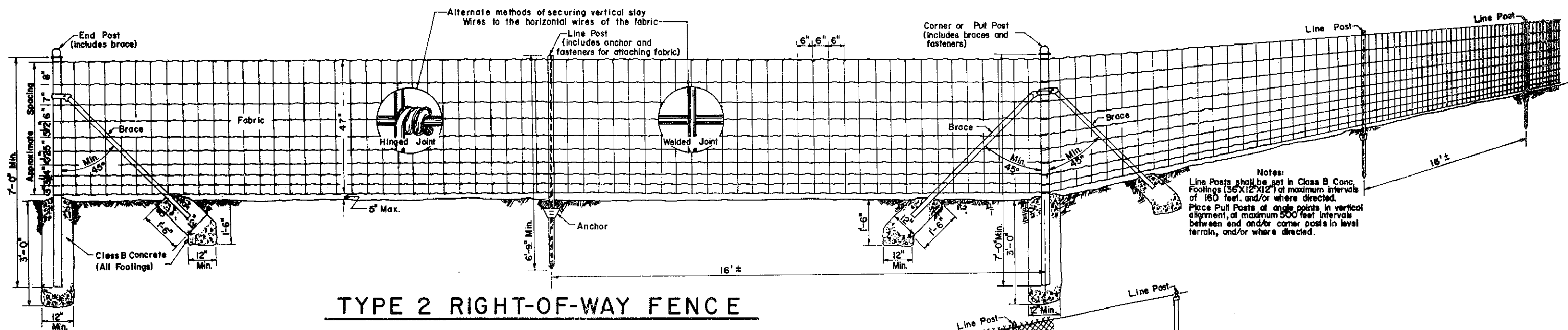
**DIMENSIONS OF END SECTIONS FOR GALVANIZED STEEL PIPE**

| Pipe Diam. in Inches | Gage | A ±1" | B Max. | H ±1" | L ±1/2" | W ±2" |
|----------------------|------|-------|--------|-------|---------|-------|
| 18                   | 16   | 8     | 10     | 6     | 31      | 36    |
| 21                   | 16   | 9     | 12     | 6     | 36      | 42    |
| 24                   | 16   | 10    | 13     | 6     | 41      | 48    |
| 30                   | 14   | 12    | 16     | 8     | 51      | 60    |
| 36                   | 14   | 14    | 19     | 9     | 60      | 72    |
| 42                   | 12   | 16    | 22     | 11    | 69      | 84    |
| 48                   | 12   | 18    | 27     | 12    | 78      | 96    |
| 54                   | 12   | 18    | 30     | 12    | 84      | 102   |
| 60                   | 12   | 18    | 33     | 12    | 87      | 114   |
| 66                   | 12   | 18    | 36     | 12    | 97      | 120   |
| 72                   | 12   | 18    | 39     | 12    | 97      | 126   |
| 78                   | 12   | 18    | 42     | 12    | 97      | 132   |
| 84                   | 12   | 18    | 45     | 12    | 97      | 138   |

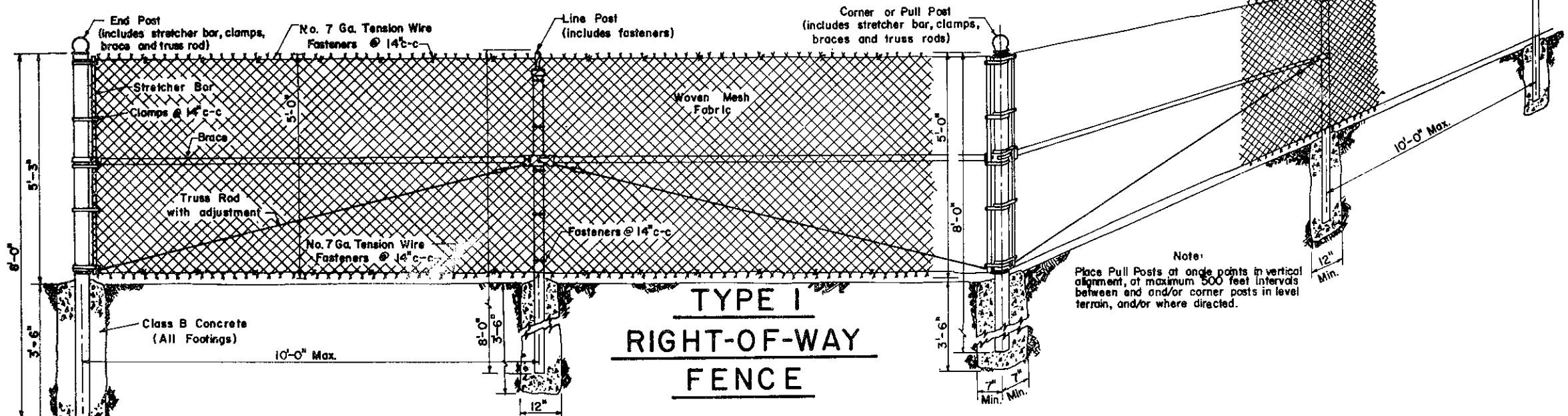
**DIMENSIONS OF END SECTIONS FOR GALVANIZED STEEL PIPE-ARCH**

| Pipe Arch in Inches | Span | Rise | Gage   | A ±1"  | B Max. | H ±1" | L ±1/2" | W ±2" |
|---------------------|------|------|--------|--------|--------|-------|---------|-------|
| 18                  | 11   | 16   | 16     | 7      | 9      | 6     | 19      | 30    |
| 22                  | 13   | 16   | 5      | 10     | 6      | 6     | 23      | 36    |
| 25                  | 16   | 16   | 6      | 11     | 6      | 6     | 28      | 42    |
| 29                  | 18   | 14   | 7      | 14     | 6      | 6     | 31 1/2  | 48    |
| 36                  | 22   | 14   | 8 3/4  | 16     | 6      | 6     | 38 1/2  | 60    |
| 43                  | 27   | 12   | 10 3/4 | 17 1/2 | 7 5/8  | 47    | 75      | 75    |
| 50                  | 31   | 12   | 12 1/4 | 20     | 9 1/8  | 54    | 85      | 85    |
| 58                  | 36   | 12   | 14     | 26     | 10 5/8 | 63    | 96      | 96    |
| 65                  | 40   | 12   | 15 3/4 | 23     | 10 5/8 | 70    | 112     | 112   |
| 72                  | 44   | 10   | 17 1/4 | 24     | 12 1/8 | 77    | 128     | 128   |

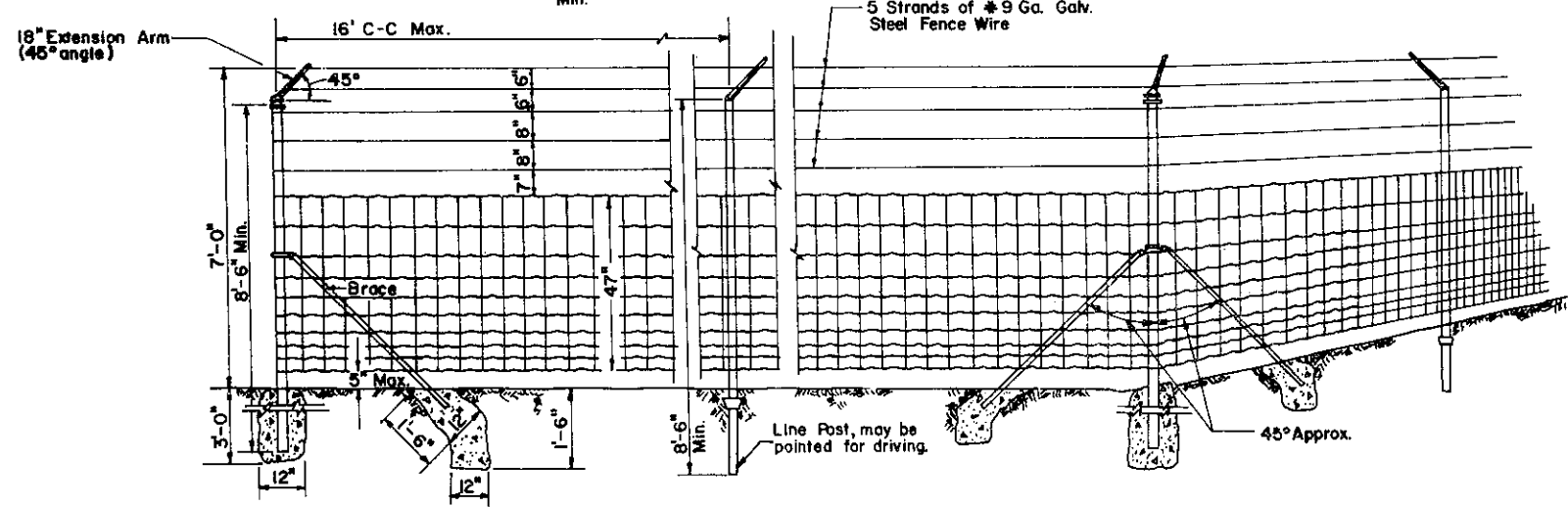
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
**END SECTIONS FOR PIPE CULVERTS**  
 APPROVED \_\_\_\_\_ FEBRUARY 24, 1969  
 \_\_\_\_\_ CHIEF ENGINEER  
 SD-15



**TYPE 2 RIGHT-OF-WAY FENCE**



**TYPE 1 RIGHT-OF-WAY FENCE**



**TYPE 3 RIGHT-OF-WAY FENCE**

Deleted reference to size of post on Type 3 R/W Fence.

Approved July 22, 1968 *W. Duckert*  
Chief Engineer

Redrawn and approved April 19, 1968

Revised Type 3 Right-of-Way Fence.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

**TYPES 1, 2 AND 3  
RIGHT OF WAY FENCE**

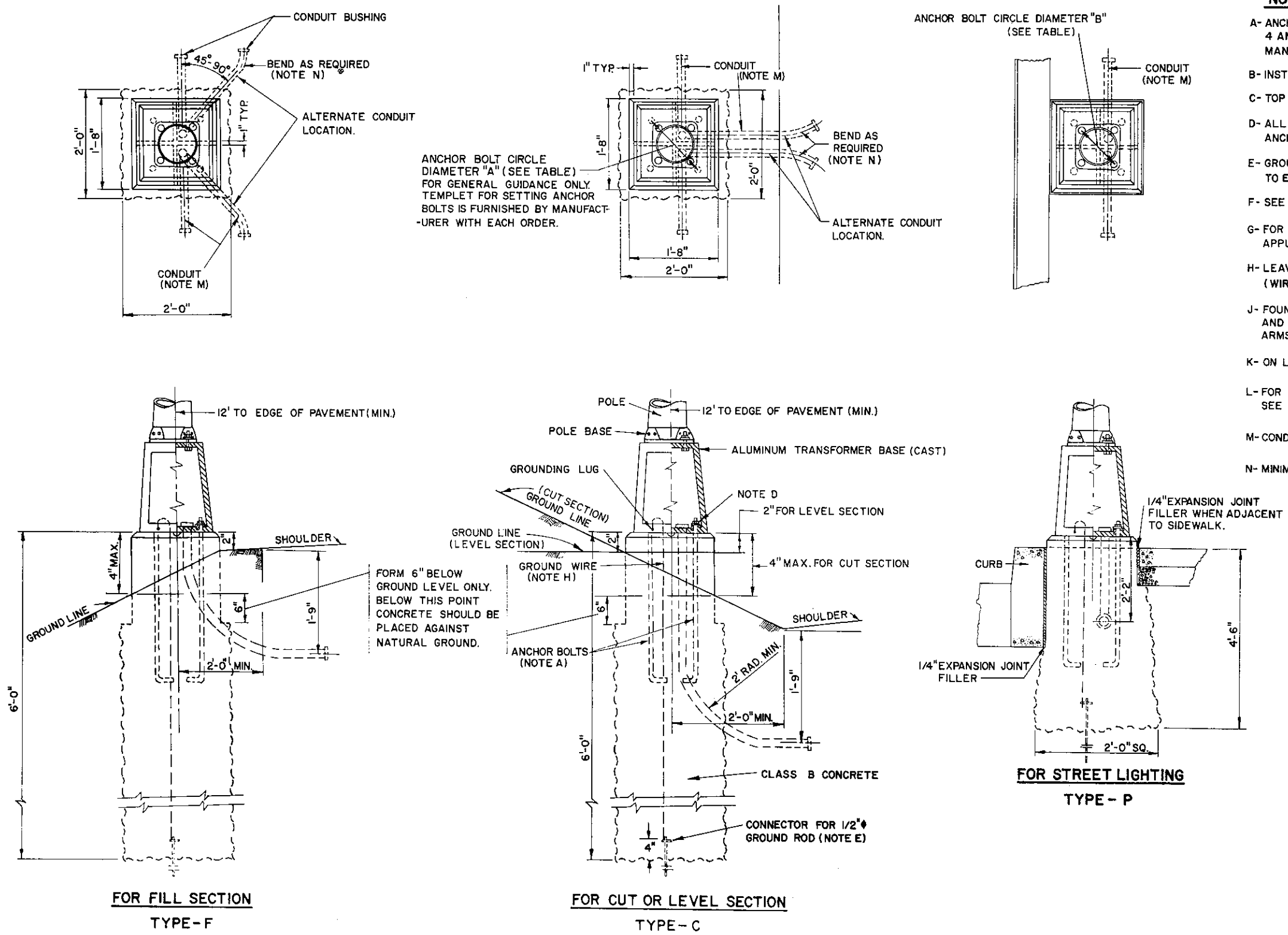
APPROVED APRIL 19, 1968  
*W. Duckert*  
CHIEF ENGINEER

**SD-16**

Notes

Extension Arm mounted away from roadway.

Details not shown, same as for Type 2 R/W Fence.



- NOTES:**
- A- ANCHOR BOLTS SHALL EXTEND 9" MIN. BELOW FORMED SECTION. 4 ANCHOR BOLTS REQUIRED, TO BE FURNISHED BY POLE MANUFACTURER. (SEE TABLE)
  - B- INSTEAD OF DIGGING 2'-0" SQ. HOLE, A 2'-4" DIAM. AUGER MAY BE USED.
  - C- TOP OF FORMS SHALL BE LEVEL IN BOTH DIRECTIONS.
  - D- ALL ANCHOR BOLT NUTS, STEEL SPRING LOCK WASHERS AND TOP 8" OF ANCHOR BOLTS SHALL BE GALVANIZED.
  - E- GROUND ROD 1/2" X 5' MIN., COPPER CLAD STEEL. MAX. RESISTANCE TO EARTH GROUND SHALL BE 25 OHMS.
  - F- SEE SD-23 FOR POLE DETAILS.
  - G- FOR FOUNDATIONS ON BRIDGES SEE STANDARDS FOR BRIDGE APPURTENANCES, ST-300 SERIES.
  - H- LEAVE 30 INCHES OF #4 GROUND WIRE COILED ABOVE FOUNDATION. (WIRE EXTENDS THROUGH CENTER OF FOUNDATION.)
  - J- FOUNDATIONS ARE DESIGNED FOR 30 FT. MOUNTING HEIGHT OF LUMINAIRES AND 15 FT. MAX. ARM LENGTH. FOR HIGHER MOUNTING HEIGHTS AND/OR LONGER ARMS, CHECK DESIGN AND REVISE, IF NECESSARY, FOR ADEQUATE STRENGTH.
  - K- ON LEVEL GROUND FOUNDATION SHALL EXTEND 2" ABOVE GROUND.
  - L- FOR ALL DIMENSIONS AND NOMENCLATURE NOT SHOWN, SEE TYPE-C THIS SHEET.
  - M- CONDUIT: DIRECT BURIAL CABLE 2" Ø. CABLE DUCT 3" Ø MAXIMUM.
  - N- MINIMUM BEND RADII'S TO BE SIX TIMES CONDUIT DIAMETER.

| MOUNTING HEIGHTS | "A"     | "B"     | ANCHOR BOLT SIZE |
|------------------|---------|---------|------------------|
| 35' MAX.         | 15"     | 11"     | 1" X 40"         |
| 40'-55'          | 17 1/4" | 15 1/4" | 1 1/4" X 48"     |

Revised Notes B, D, & E  
 Approved November 7, 1969  
 Chief Engineer

Revised Anchor Bolts.  
 Approved March 21, 1969  
 Chief Engineer

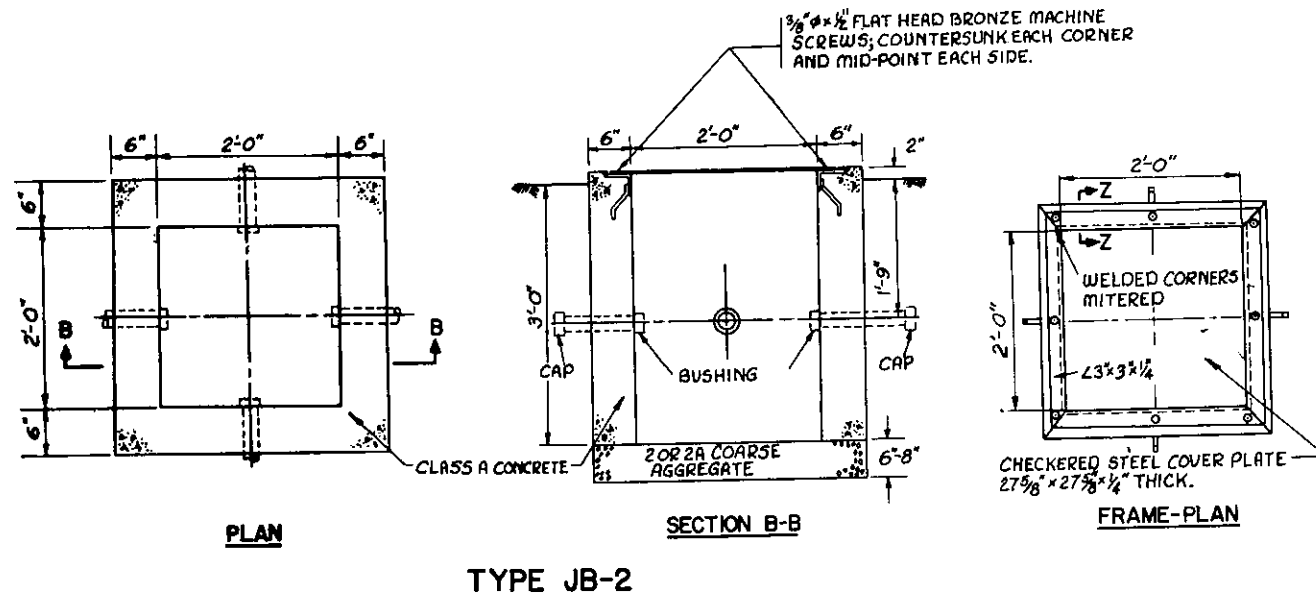
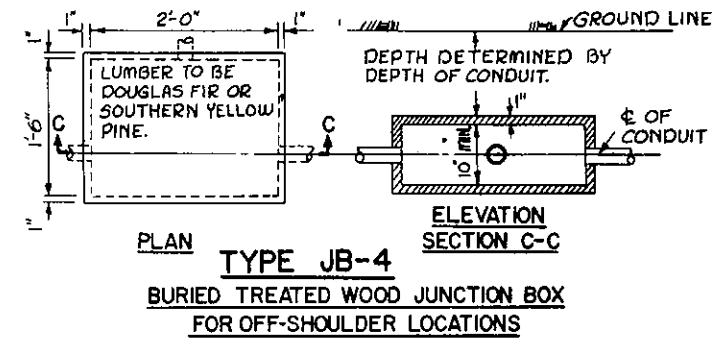
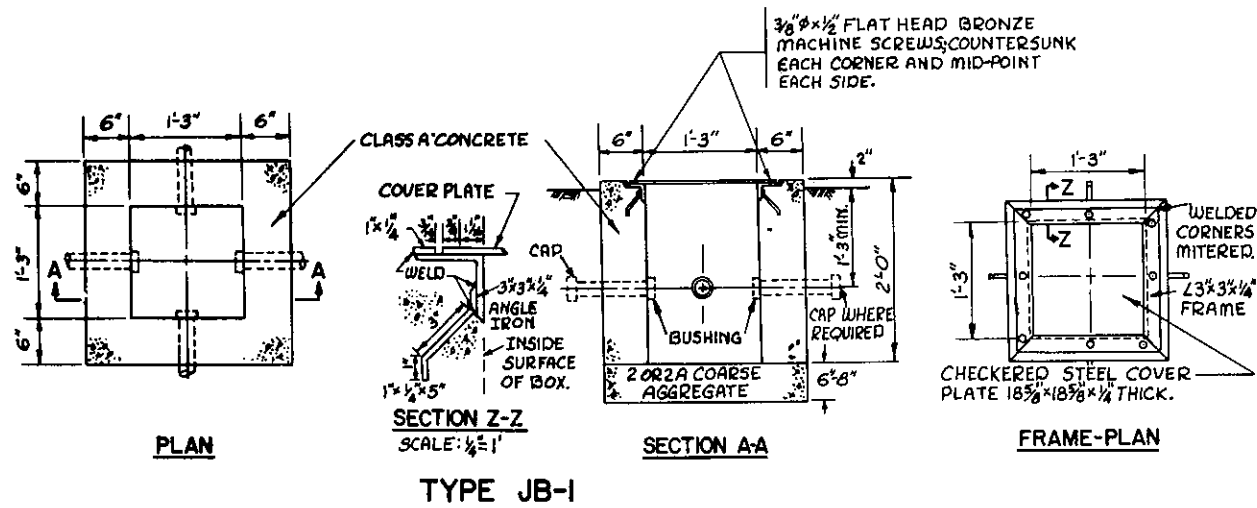
Revised to add notes M and N.  
 Approved 11/8/68  
 Chief Engineer

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 HIGHWAY LIGHTING  
 FOUNDATIONS

APPROVED February 5, 1968  
 Chief Engineer

SD-20

SCALE 1/4" = 1'-0"



**NOTES:**

JB-1 AND JB-2 SHALL BE USED IN LOCATIONS WHERE THEY WILL BE SUBJECT TO LOADS NO HEAVIER THAN PEDESTRIAN TRAFFIC.

FOR OTHER LOCATIONS USE JB-11 OR JB-12 SHOWN ON SHEET 3.

EQUIVALENT APPROVED PRECAST JUNCTION BOXES MAY BE SUBSTITUTED FOR JB-1 AND JB-2 SHOWN.

AFTER INSTALLATION, ALL EXPOSED STEEL SHALL BE PAINTED WITH ONE COAT OF RED LEAD AND ONE COAT APPROVED BITUMINOUS PAINT.

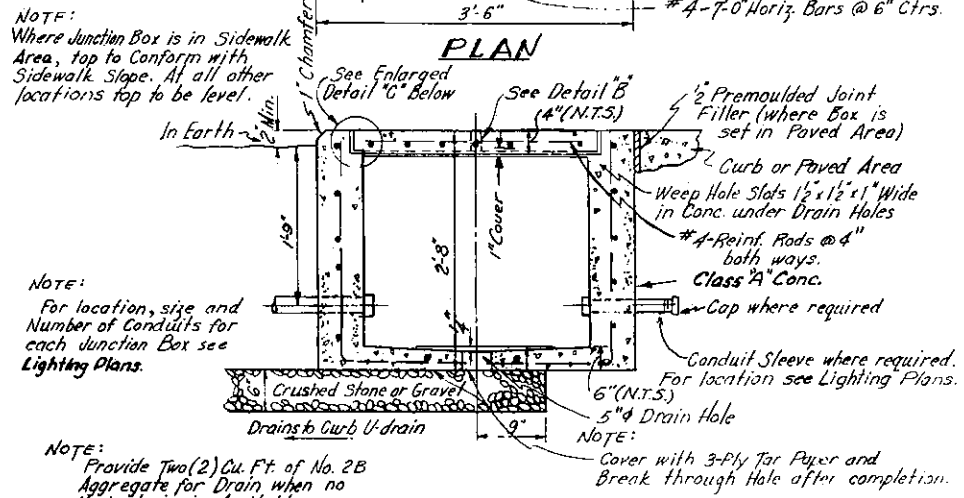
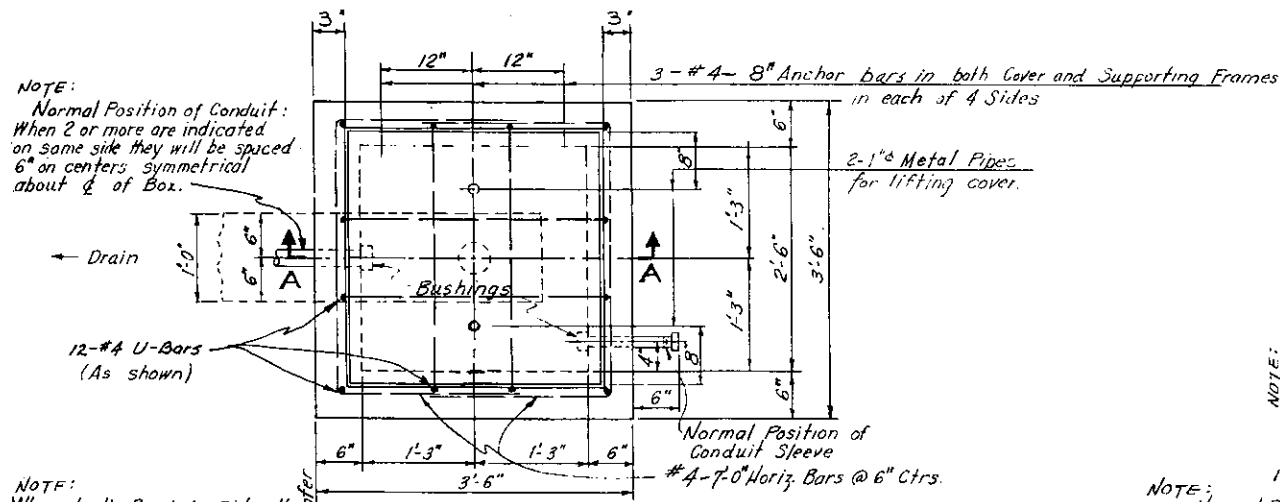
SCALE: 1"=1'-0" UNLESS NOTED

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
HIGHWAY LIGHTING  
JUNCTION BOXES-LIGHT DUTY

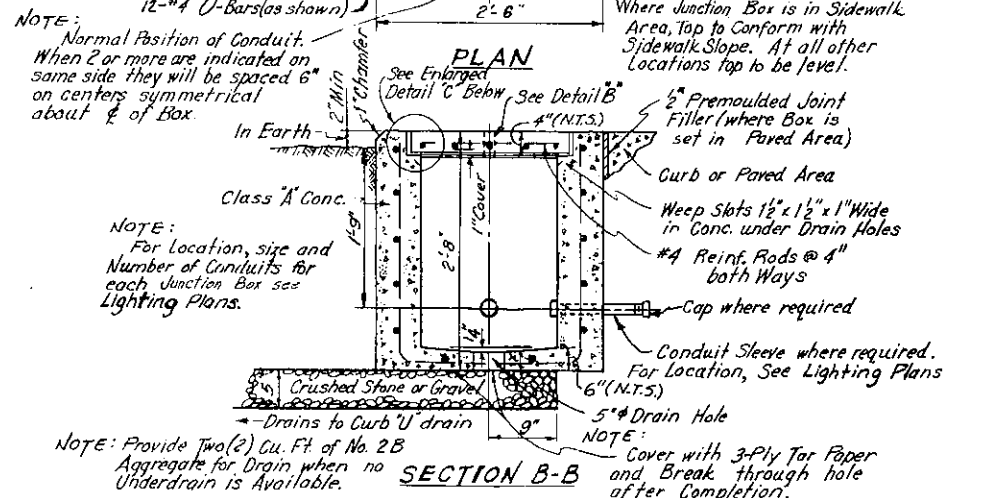
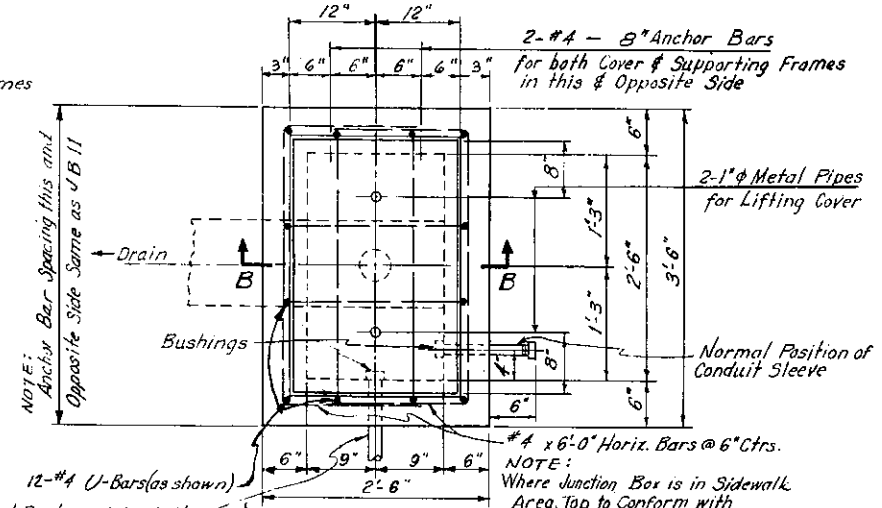
APPROVED February 5, 1968

*W. M. ...*  
CHIEF ENGINEER

SD-21

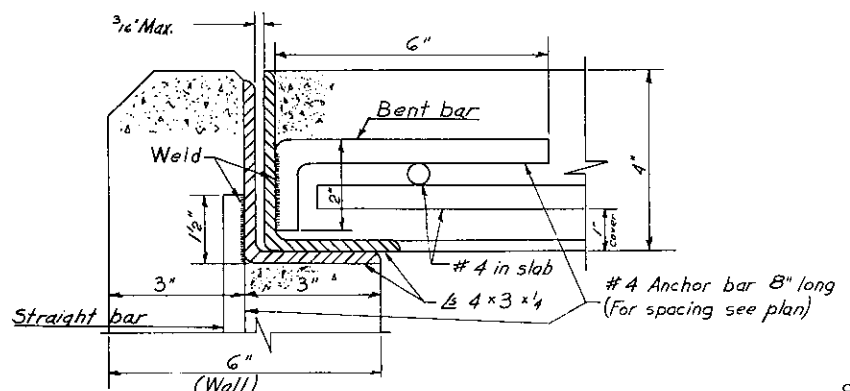
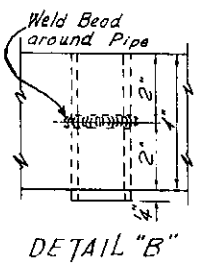
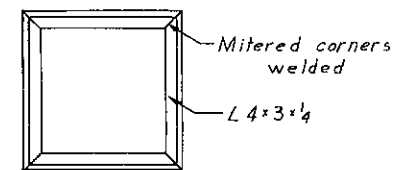


SECTION A-A  
JUNCTION BOX JB-11  
Scale: 1"=1'-0"



SECTION B-B  
JUNCTION BOX JB-12  
Scale: 1"=1'-0"

- NOTES:
- 1-JB-11 and JB-12 shall be Used In Shoulders or other Locations where they will be subject to Vehicular Loads.
  - 2-For other Locations Use JB-1 or JB-2 Shown on Sheet 2.
  - 3-Equivalent Approved Precast Junction Boxes May be Substituted for JB-11 and JB-12 Shown.



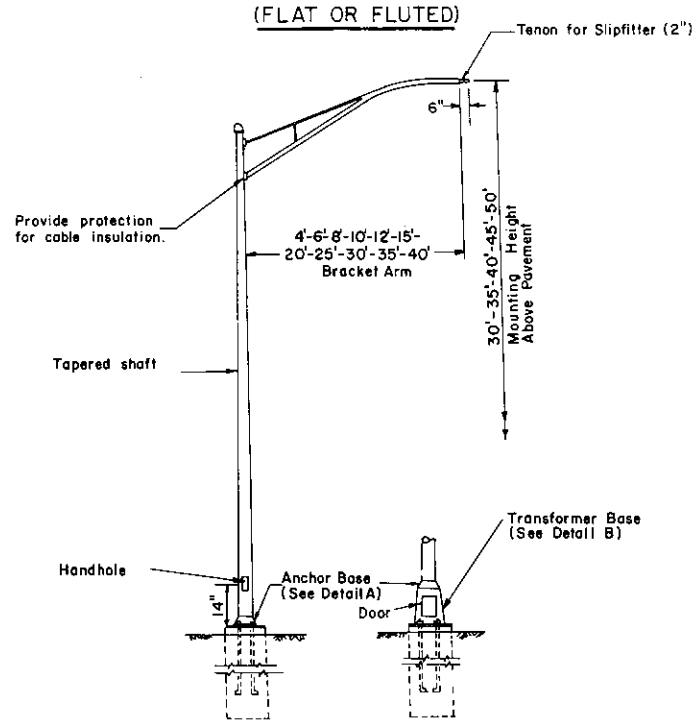
Structural Steel shall conform to ASTM A-36 designation.  
Structural Aluminum shall conform to 6061-T6 designation.  
All concrete to be Class "A".

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
HIGHWAY LIGHTING  
JUNCTION BOXES-HEAVY DUTY

APPROVED February 5, 1968  
*W. A. ...*  
CHIEF ENGINEER



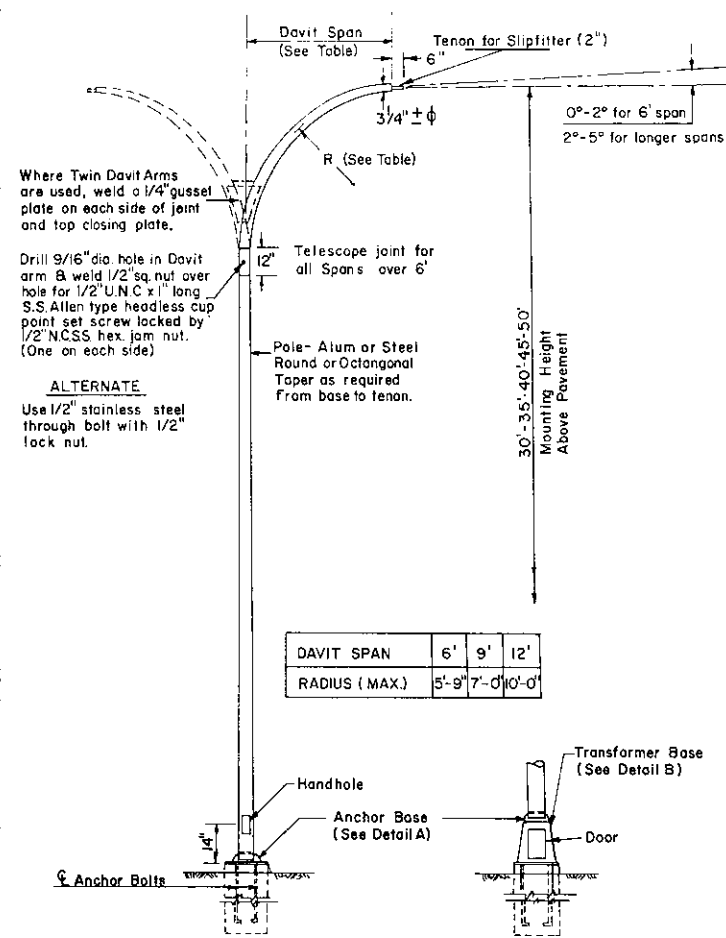
### ROUND ALUMINUM and STEEL POLES AND OCTAGONAL STEEL POLES (FLAT OR FLUTED)



#### GENERAL NOTES

- See SD-20 for details on pole foundations and transformer bases.
- Aluminum Poles - Shaft base diameter may vary from 8" - 14" and shaft wall thickness from .188" - .312" depending on mounting height and arm length.
- Steel Poles - Shaft base diameter may vary from 7.5" - 10.0". Nominal shaft wall thickness is 11 gage. (Does not apply to Sectional Steel Poles.)
- Manufacturer's certification of compliance with load tests outlined in Form 40B is required for all poles.
- Cast aluminum transformer base is required for all poles within 30 feet of edge of pavement except when pole is mounted on parapet or wall, or when located behind guard rail.
- Where all steel and aluminum poles or transformer bases are in contact with concrete, a caulking compound shall be used which will be an approved aluminum impregnated gray mastic type, meeting the test requirements of the Federal Specification TT-C 598 (2).
- Identification plates shall be provided for all poles.
- Bolt template for anchor base or transformer base furnished by manufacturer.
- Approved Materials for Poles:
  - Aluminum and Stainless Steel.
  - Steel - by special approval.

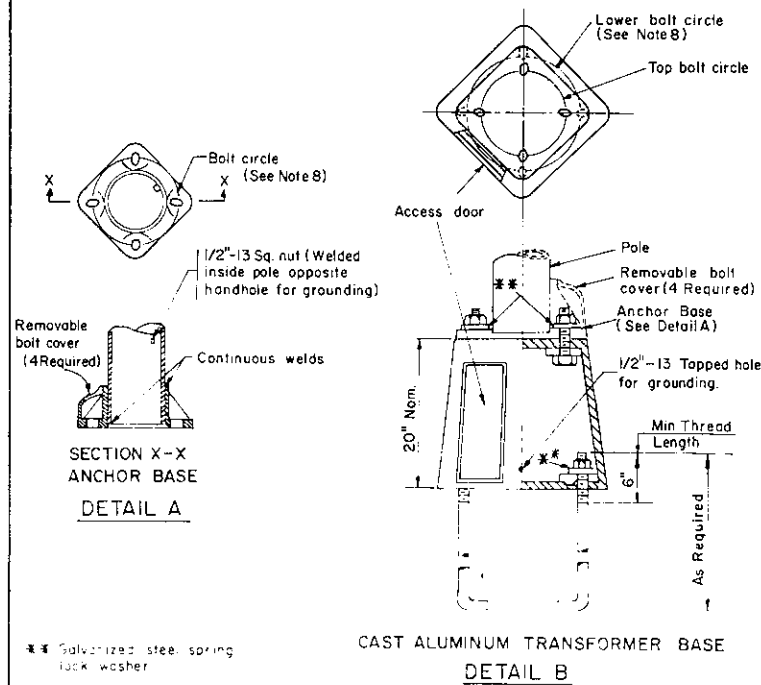
### DAVIT-TYPE POLES



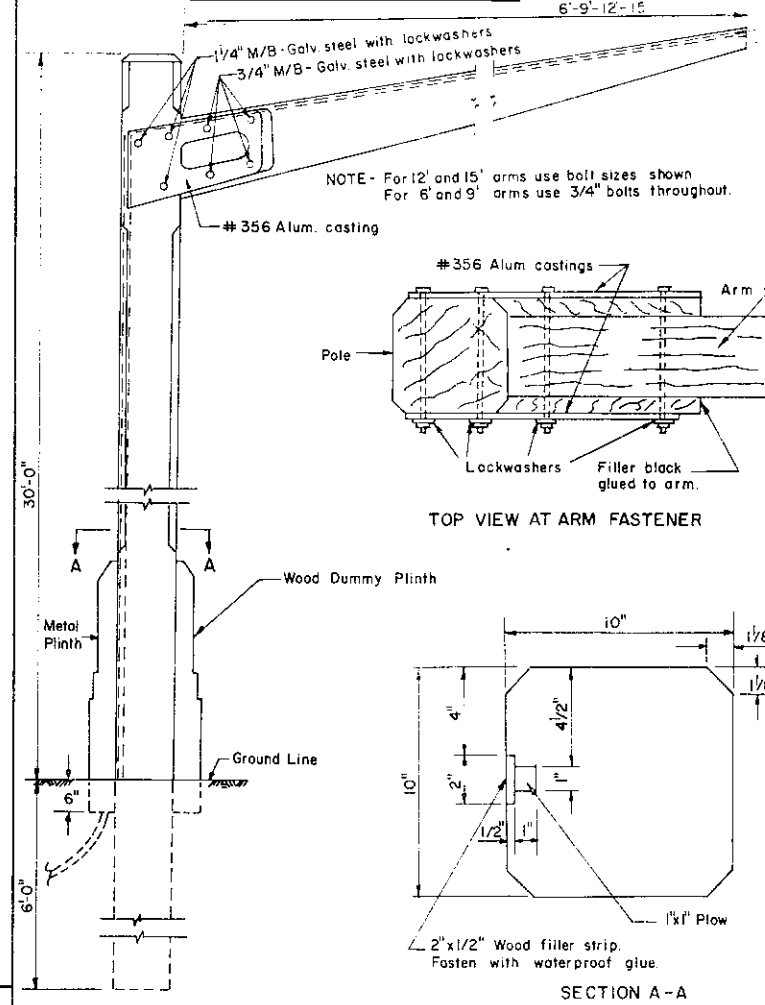
#### NOTE

The anchor and transformer base dimensions vary with mounting height.

### POLE BASES



### RUSTIC WOOD POLES\*

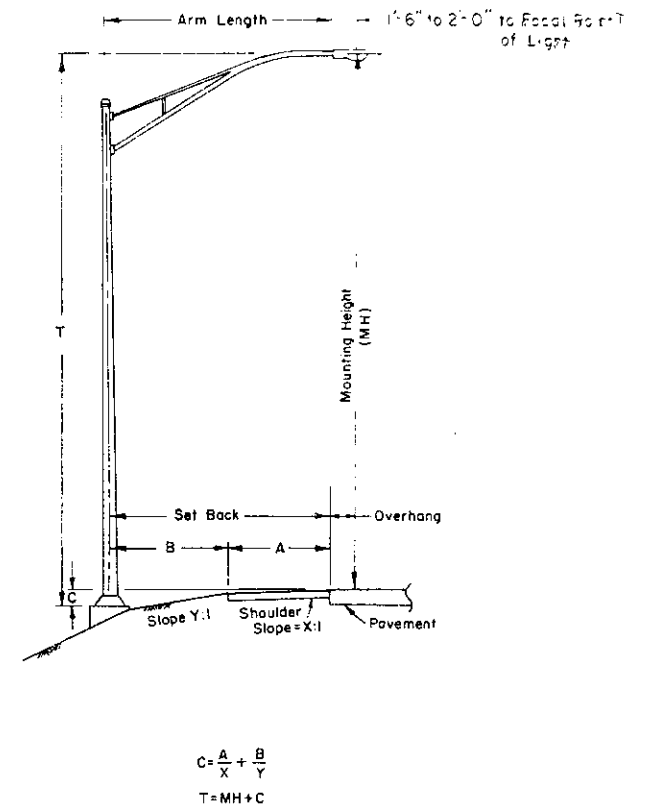


#### NOTE

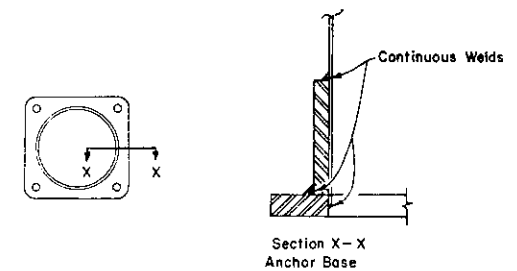
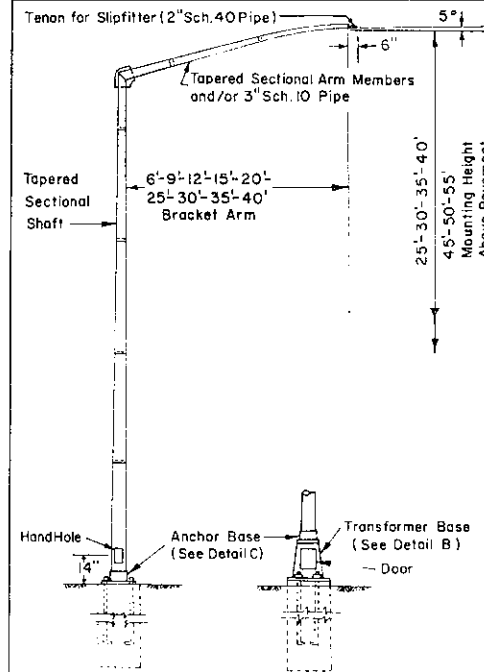
Wood Poles approved only for rest area lighting.

\* Western Red Cedar

### TERMINOLOGY



### SECTIONAL STEEL POLES



#### DETAIL C

Revision to note 7 and Terminology  
 Drawing Approved November 7, 1969 *W. A. ...* CHIEF ENGINEER  
 Revised to add sectional Steel Poles  
 Approved: JUNE 27, 1969 *W. A. ...* CHIEF ENGINEER

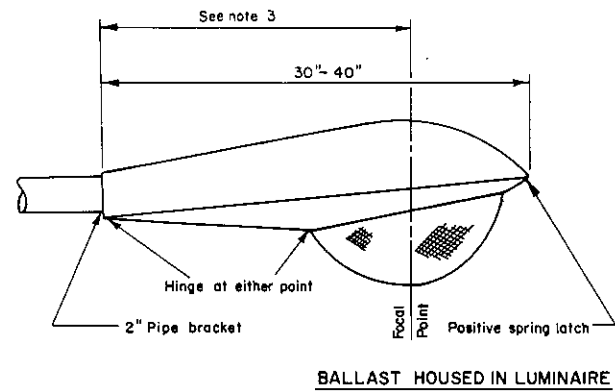
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 HIGHWAY LIGHTING  
 LIGHTING POLE DETAILS

APPROVED NOVEMBER 8, 1968

CHIEF ENGINEER

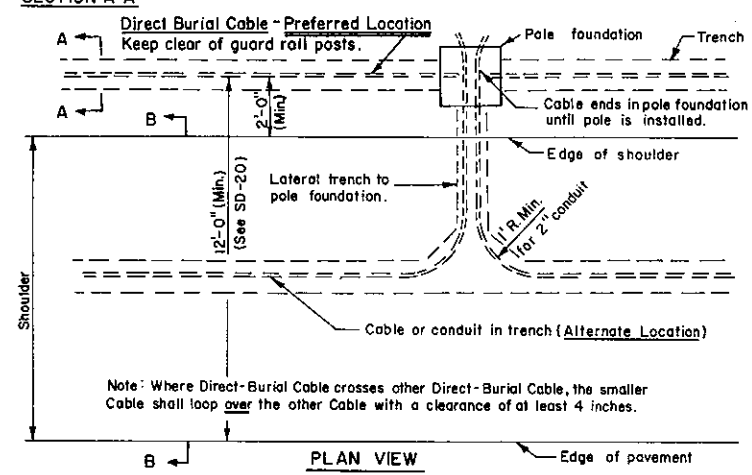
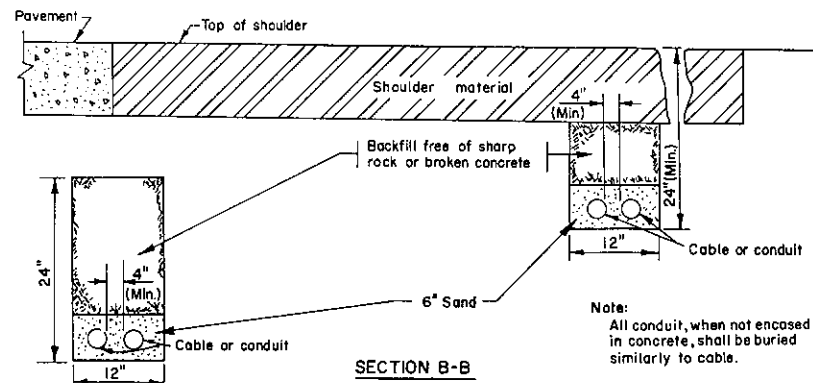
SD-23

### LUMINAIRES FOR MERCURY LAMPS

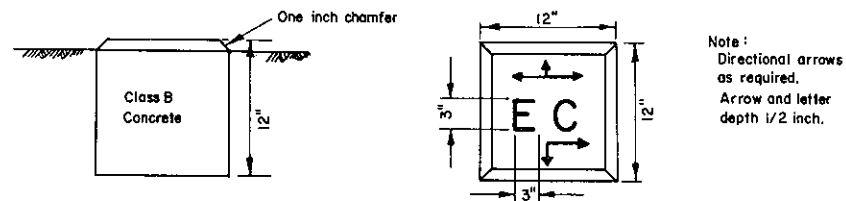


- Notes:
- (1) Luminaires to have Reflector-Refractor Type Optical System, with thermal shock-resisting Glass Prismatic Refractor.
  - (2) Luminaires to accommodate 250, 400, 700 & 1000-Watt Mercury Lamps, in approximate horizontal position.
  - (3) Focal distance or light center varies from 1 1/2 to 2 ft.-Refer to SD-23.

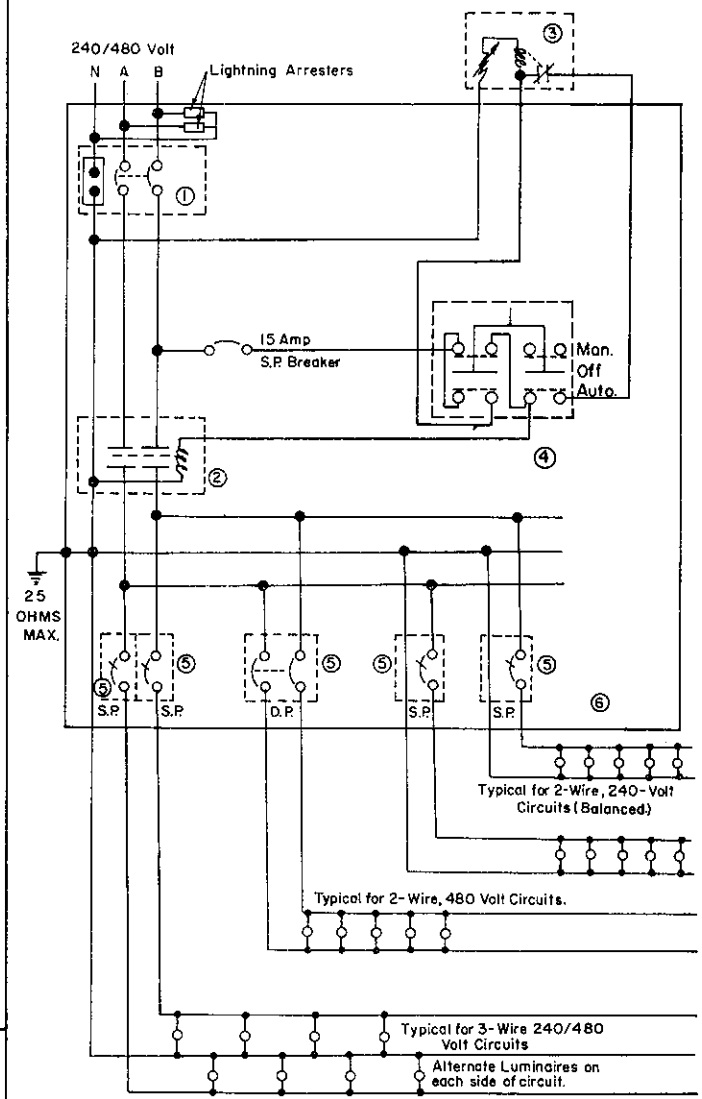
### DIRECT-BURIAL CABLE & CONDUIT



### CABLE & CONDUIT MARKER

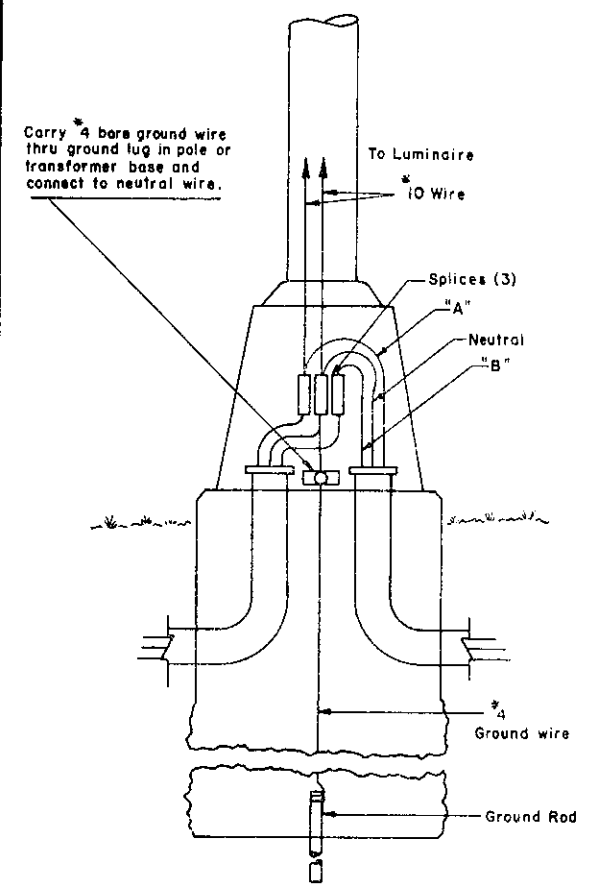


### CONTROL CABINET SCHEMATIC WIRING DIAGRAM (TYPICAL)

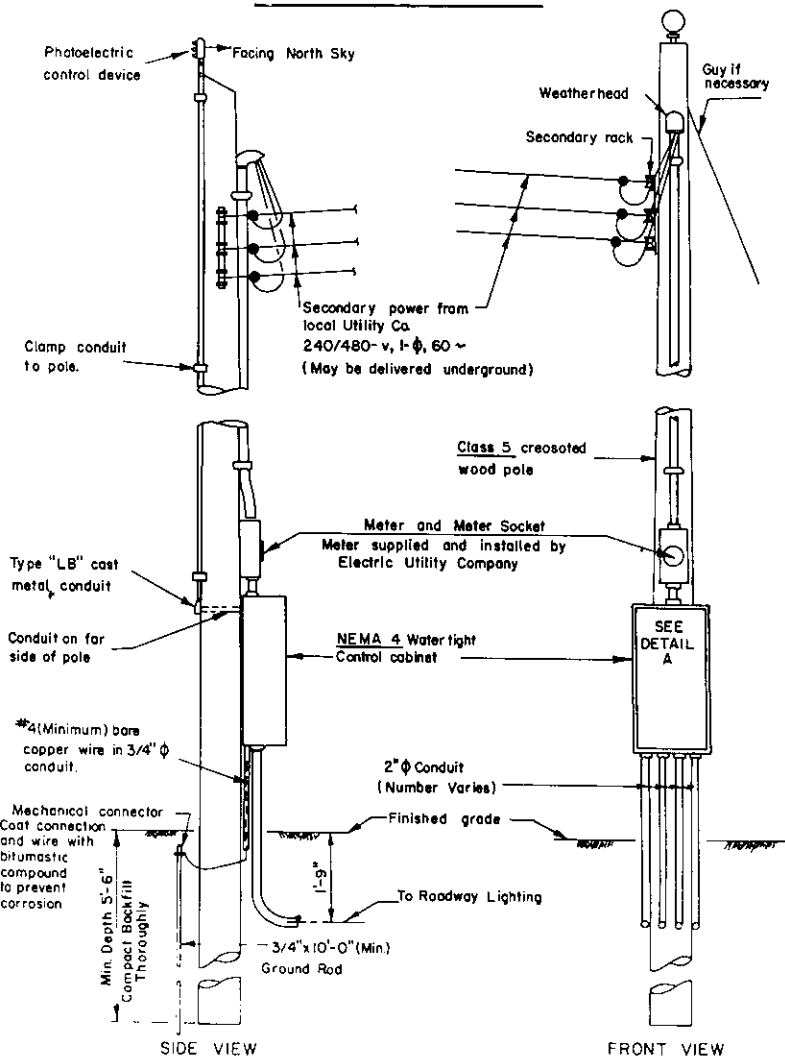


- M- Manual  
A- Automatic  
1- Main Circuit Breaker  
2- Control Contactor  
3- Photoelectric Cell  
4- Selector Switch  
5- Distribution Breakers  
6- Control Cabinet  
S.P- Single Pole  
D.P- Double Pole
- Notes:  
1- Items 2, 3, & 4 not required if each Luminaire has photoelectric control element.  
2- Item 5 not required for single circuit.

### WIRING DETAIL



### TYPICAL TERMINAL POLE EQUIPMENT ARRANGEMENT FOR POWER SUPPLY



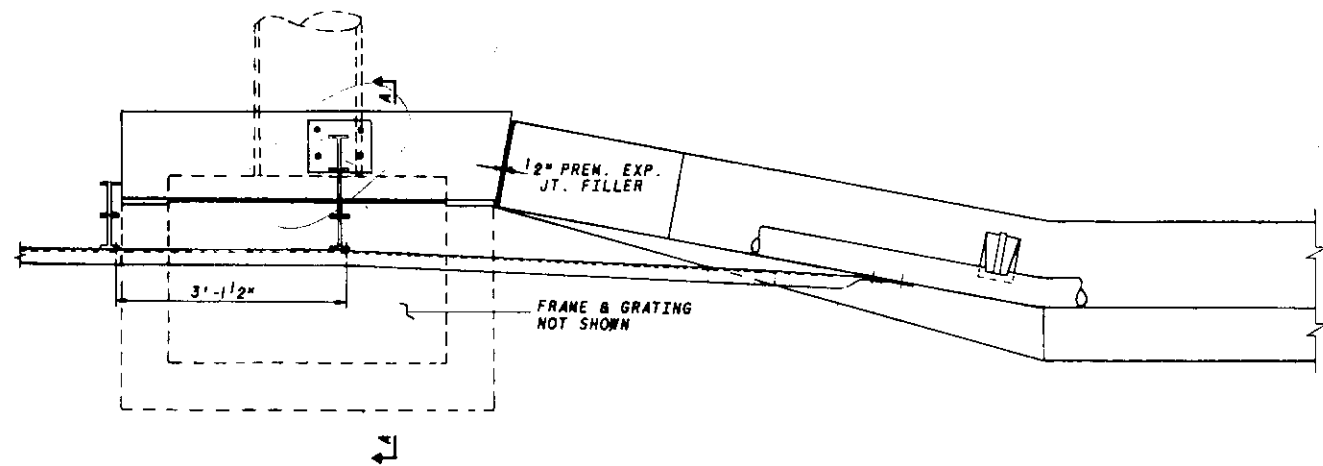
1. Added Wiring Detail  
2. Revised Buried Cable Note and Schematic Switching

Approved November 7, 1969 *[Signature]*  
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
HIGHWAY LIGHTING  
LIGHTING & ELECTRICAL DETAILS

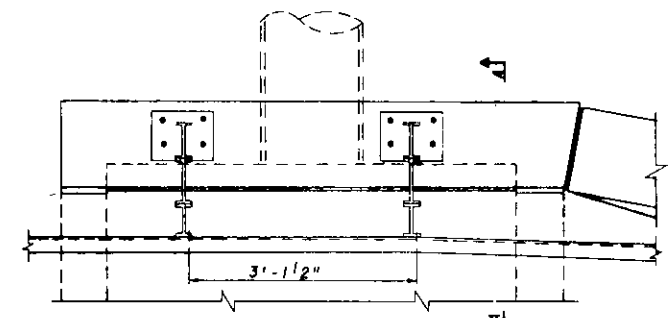
APPROVED JUNE 27, 1969  
*[Signature]*  
CHIEF ENGINEER

**SD-24**



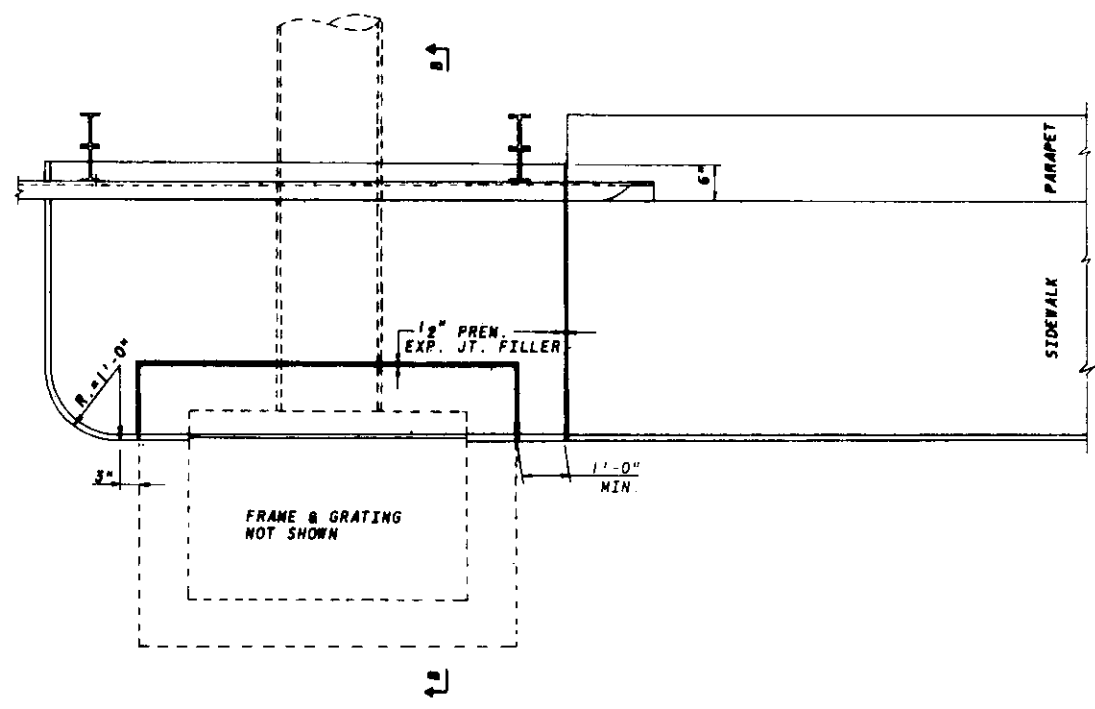
**INLET PLAN**

(4'-0" SPECIAL INLET MODIFIED SHOWN)  
 FOR A 6'-0" SPECIAL INLET MODIFIED, SEE DETAIL A,  
 PARTIAL 6'-0" SPECIAL INLET MODIFIED PLAN.

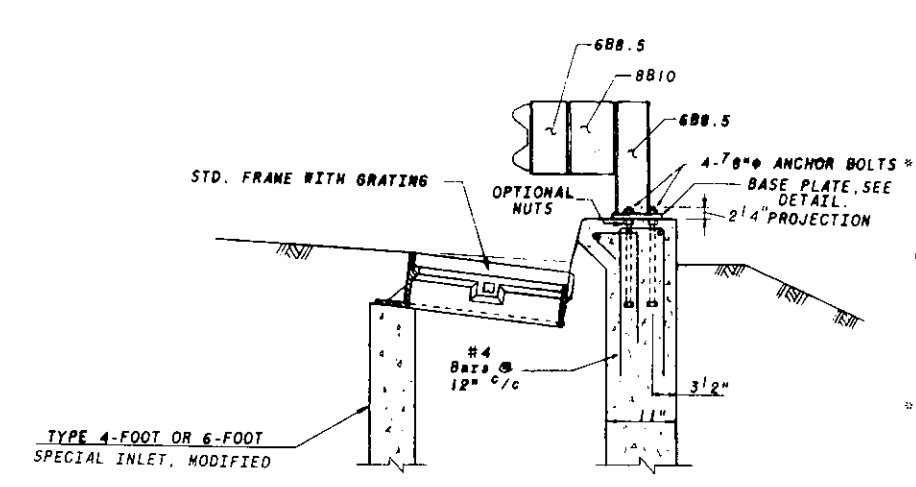


**DETAIL A**

(PARTIAL 6'-0" SPECIAL INLET MODIFIED PLAN.)

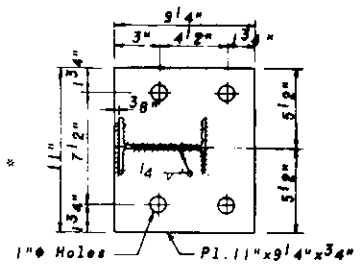


**INLET PLAN**



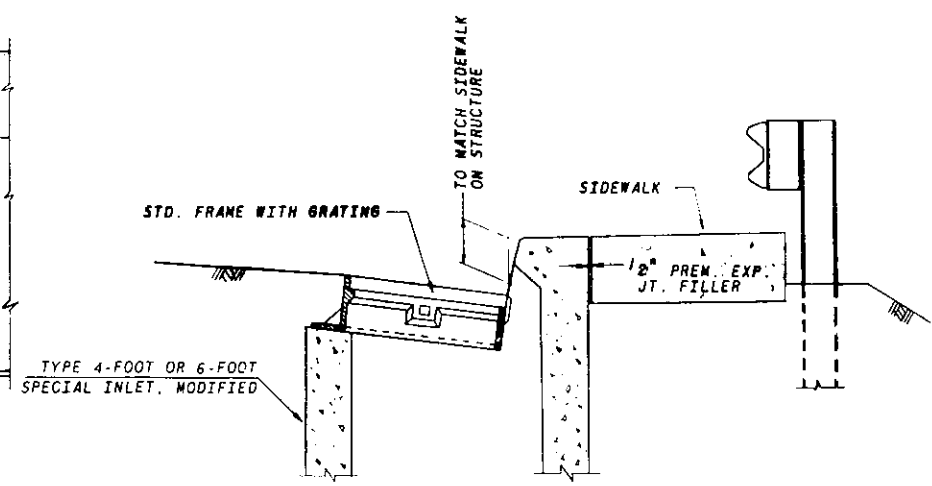
**SECTION A-A**

FOR ADDITIONAL DETAILS, REFER TO S.I. 4 & 6 STANDARD DRAWING.



**BASE PLATE DETAIL**

\* 4-7/8" X 1'-0" ANCHOR BOLTS,  
 3 1/2" THD., HEX. NUT & PL.  
 WASHER; AND SQ. OR HEX.  
 HEAD.



**SECTION B-B**

FOR ADDITIONAL DETAIL, REFER TO S.I. 4 & 6 STANDARD DRAWING

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS

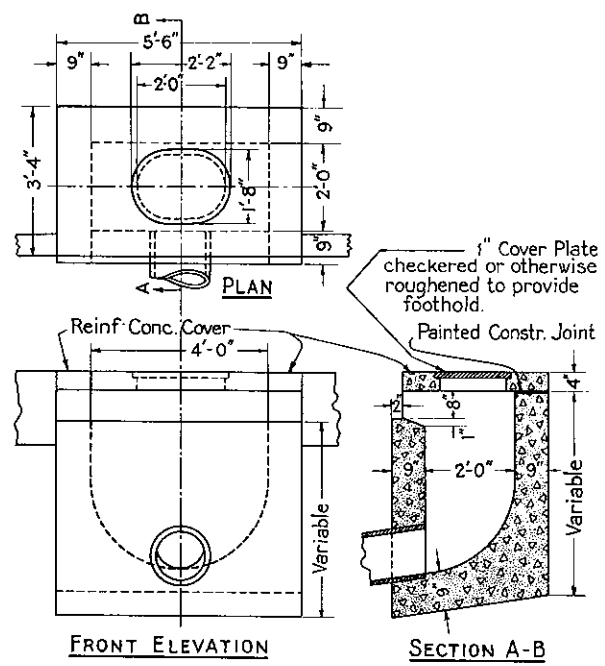
**INLET PLACEMENT AT END OF STRUCTURE**

APPROVED APRIL 6, 1970

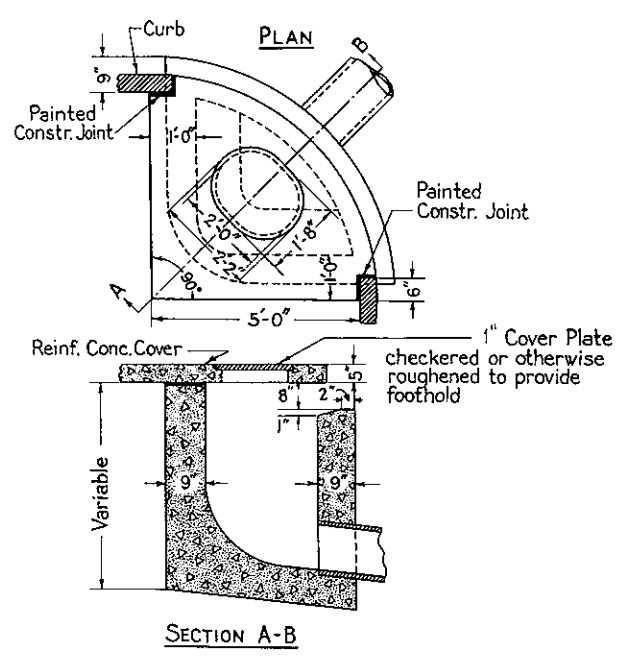
*Whuske*  
 CHIEF ENGINEER

SHEET 1 OF 1

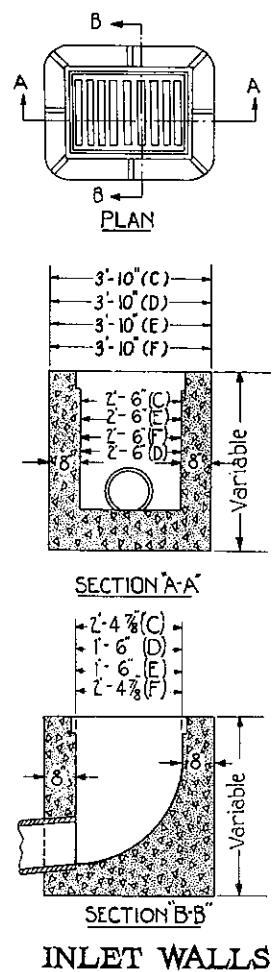
**SD-30**



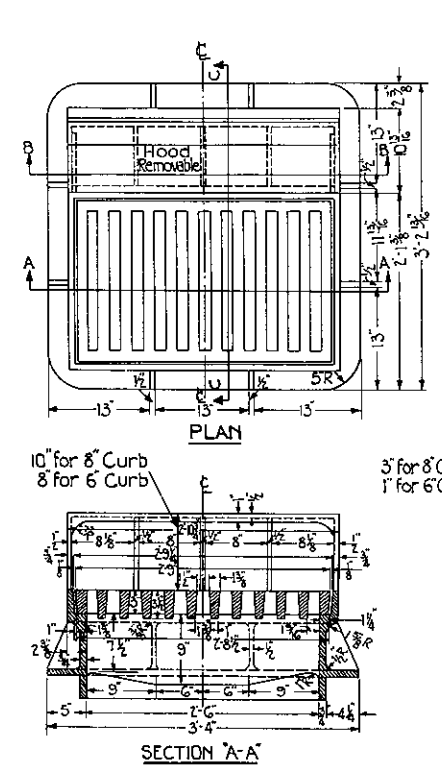
OPEN MOUTH SIDE INLET  
TYPE A



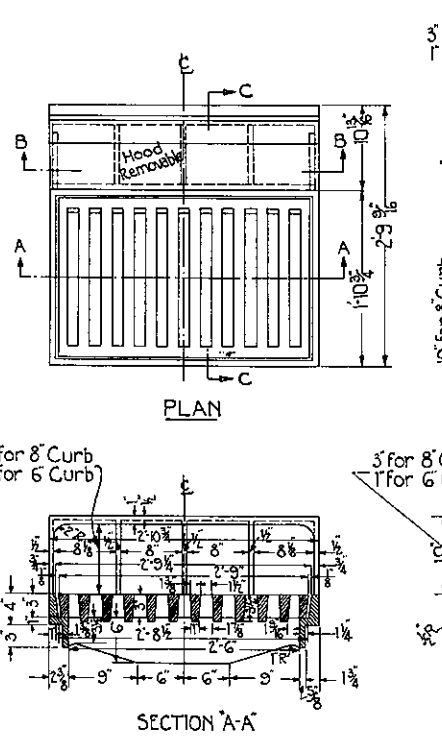
OPEN MOUTH CORNER INLET  
TYPE B



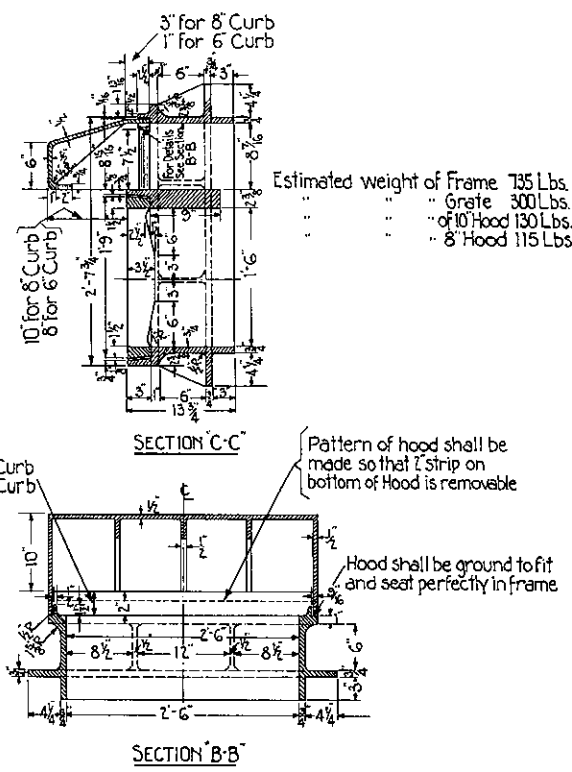
INLET WALLS



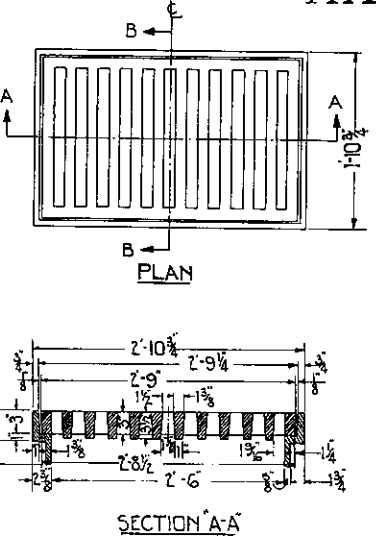
COMBINATION  
GRATE OPEN MOUTH INLET  
TYPE C



COMBINATION  
GRATE OPEN MOUTH INLET  
TYPE F



GRATE INLET  
TYPE D



GRATE INLET  
TYPE E

Estimated weight of Frame 735 Lbs.  
Grate 300 Lbs.  
of 10' Hood 130 Lbs.  
8' Hood 115 Lbs.

Estimated weight of Frame 475 Lbs.  
Grate 300 Lbs.

Estimated weight of Frame 200 Lbs.  
Grate 300 Lbs.

Estimated weight of Frame 360 Lbs.  
Grate 300 Lbs.  
of 10' High Hood 130 Lbs.  
8' Hood 115 Lbs.

NOTE:- Walls of inlets shall be modified similar to manhole construction (Std. Dwg. SD-6) when the diameter of the required pipe exceeds the dimensions shown for the specified inlet box.

Revised for deletion of Manhole and for NOTES  
Approved November 1, 1961  
[Signature] CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
STANDARD INLETS

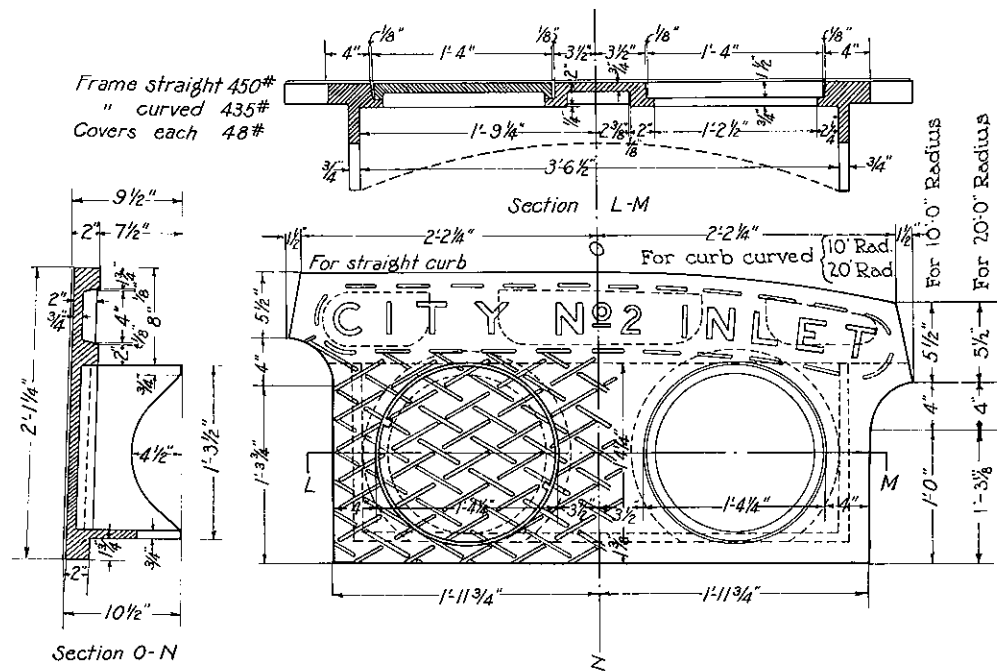
Approved June 5, 1929  
[Signature] CHIEF ENGINEER

STD. INLETS

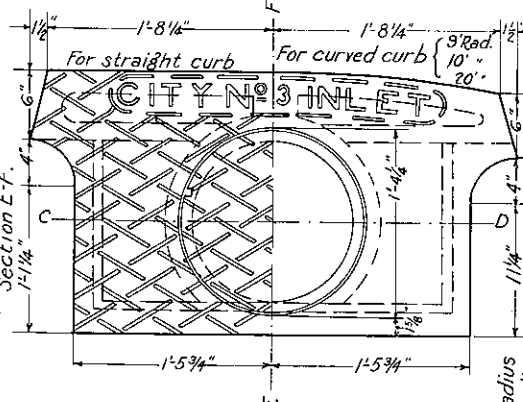
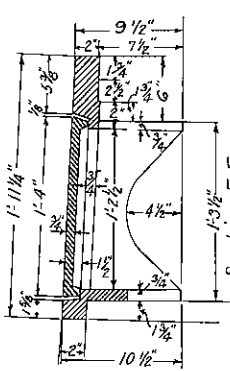
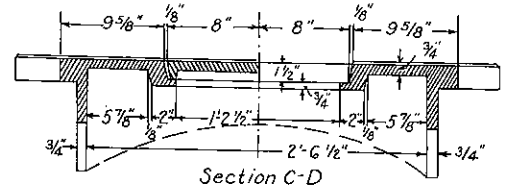
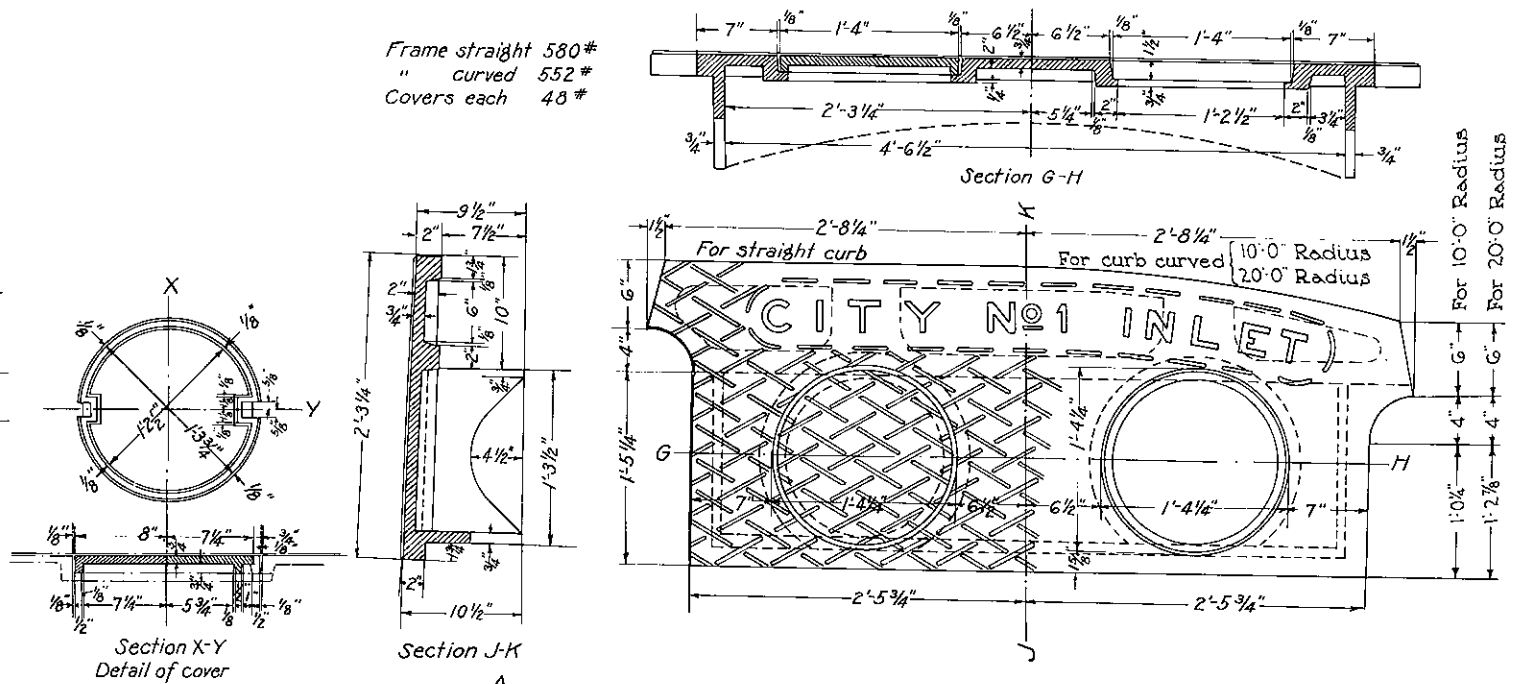
NOTE:-  
All fillets to be 3/8 radius.  
All edges and corners to be rounded to 1/4 radius unless otherwise shown.  
All inlets shall be set approximately 2" below the grade of the gutter, or ditch as directed by the Engineer in each case.  
Deviation in weight of castings not to exceed 5% under weights specified on drawings.

Traced by  
Final by

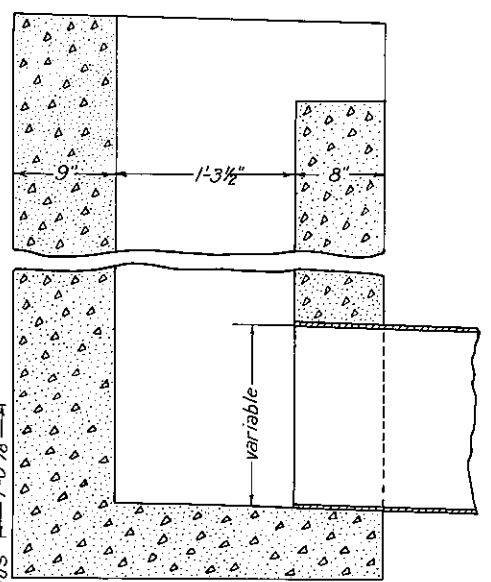
Frame straight 450#  
" curved 435#  
Covers each 48#



Frame straight 580#  
" curved 552#  
Covers each 48#

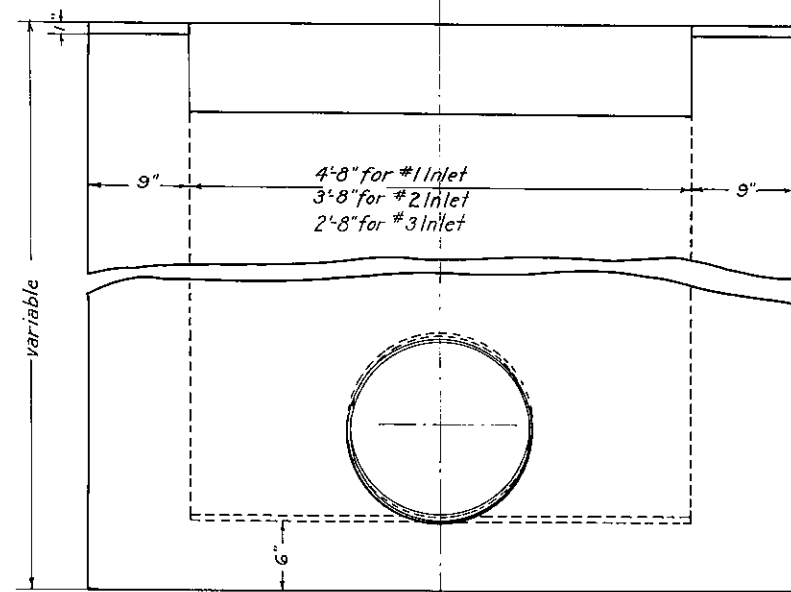


Frame - Straight 333#  
Cover - 48#



**BASIN FOR CITY INLETS**

Scale: 1/2" = 1'



**DETAILS OF OPEN MOUTH CITY INLETS**

Scale 1/2" = 1'

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

**— STANDARD DETAILS —**

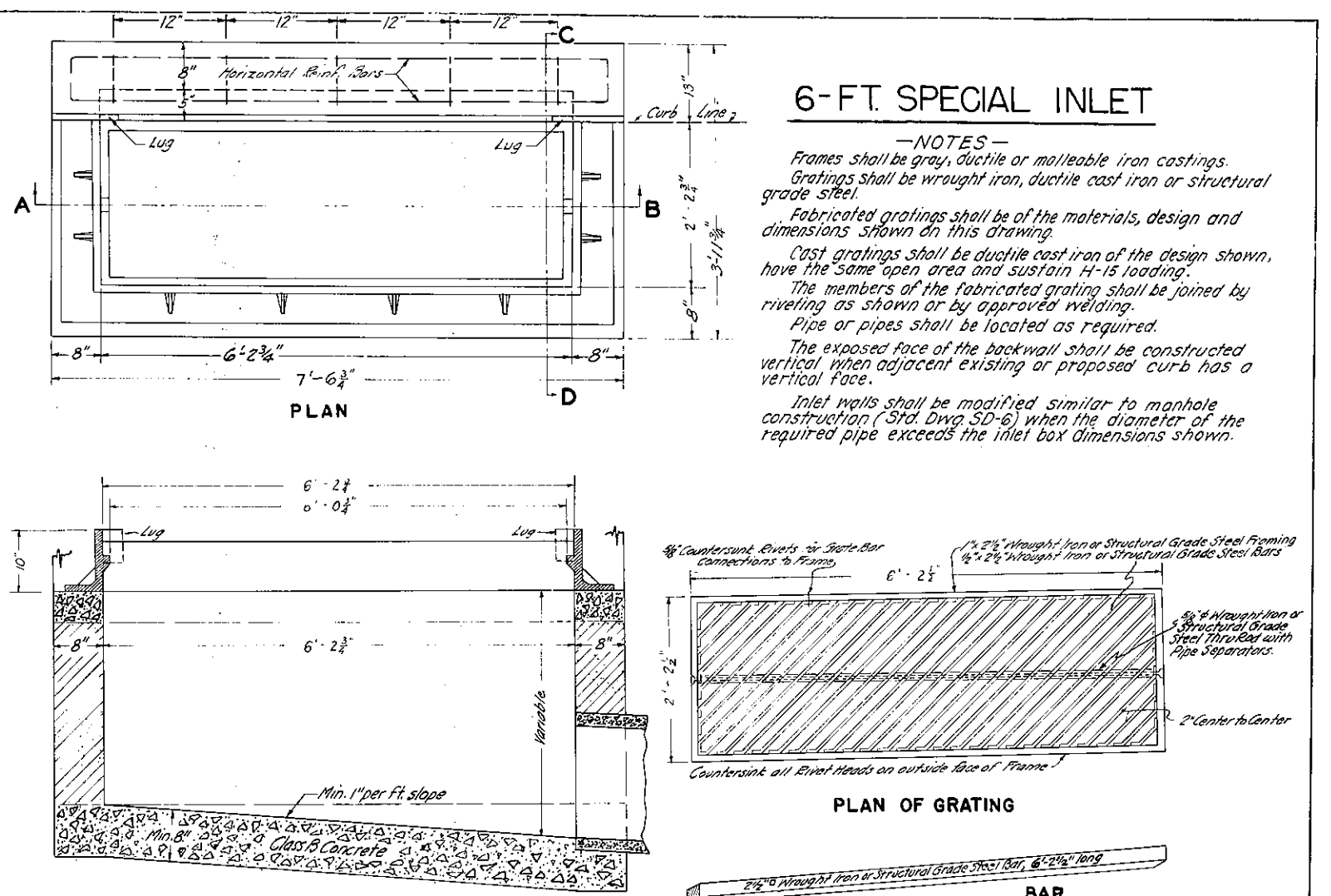
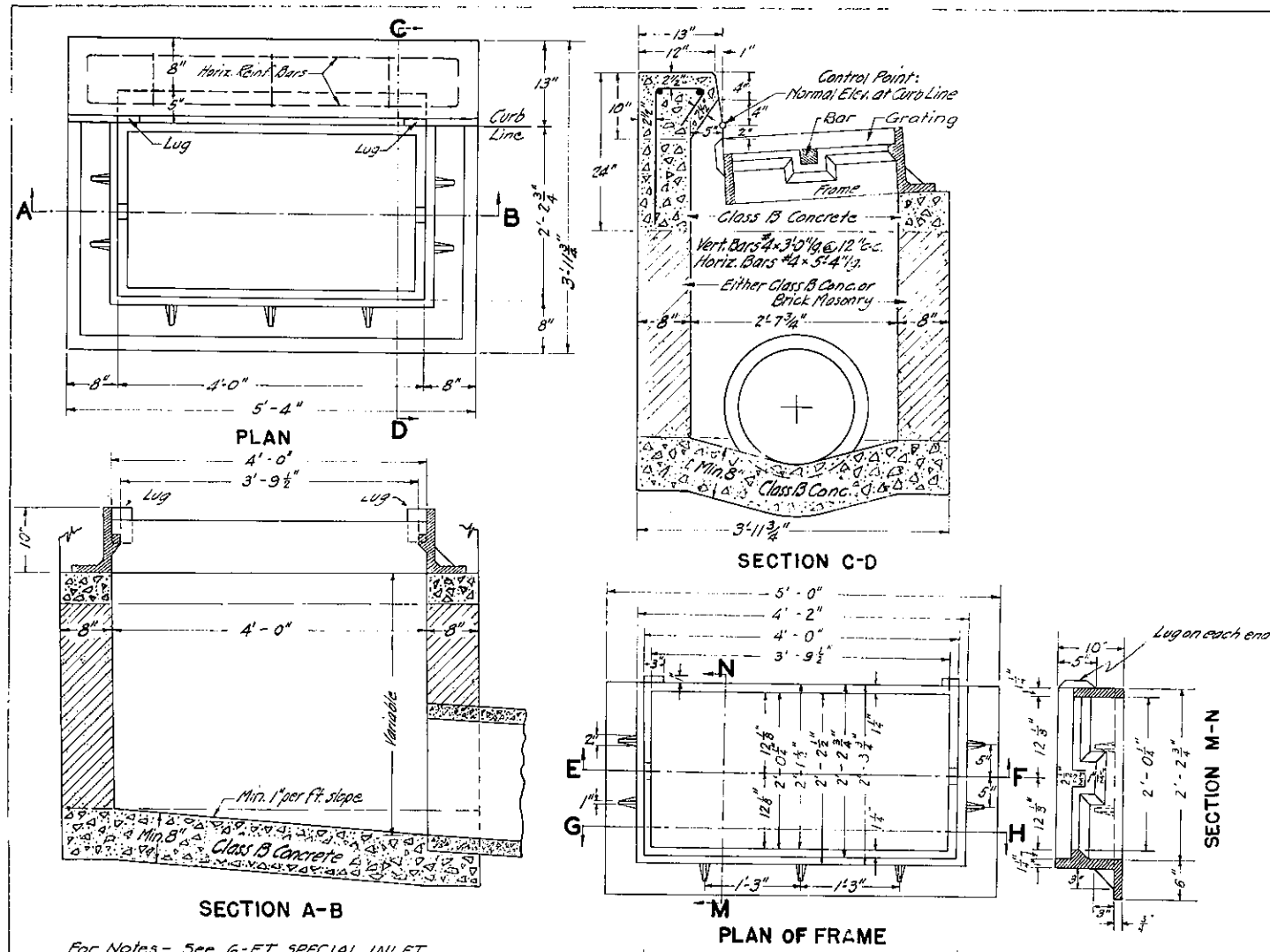
**OPEN MOUTH CITY INLETS**

APPROVED

November 1, 1961

**CITY INLETS**

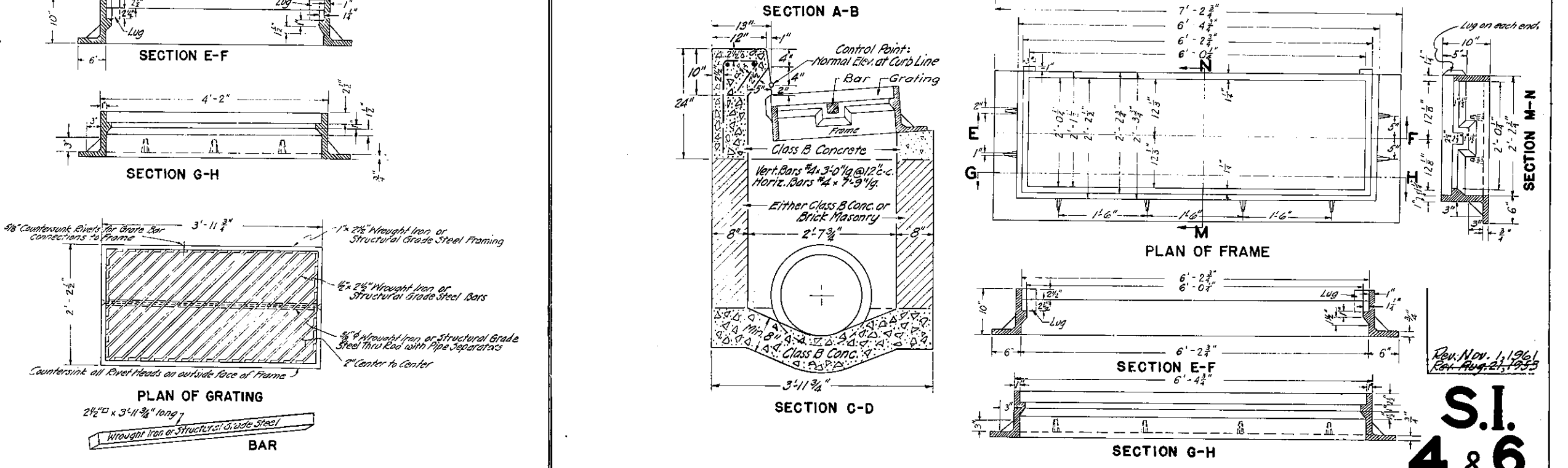
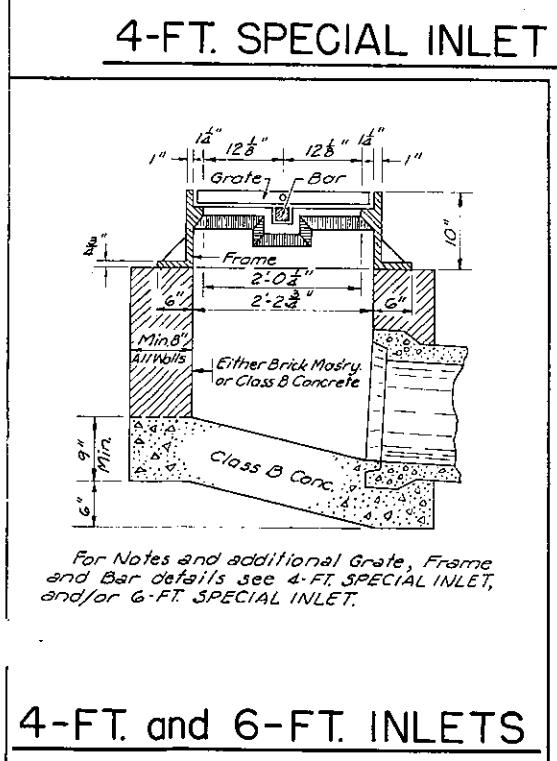
Traced by DON HEATY  
Final by



**6-FT. SPECIAL INLET**

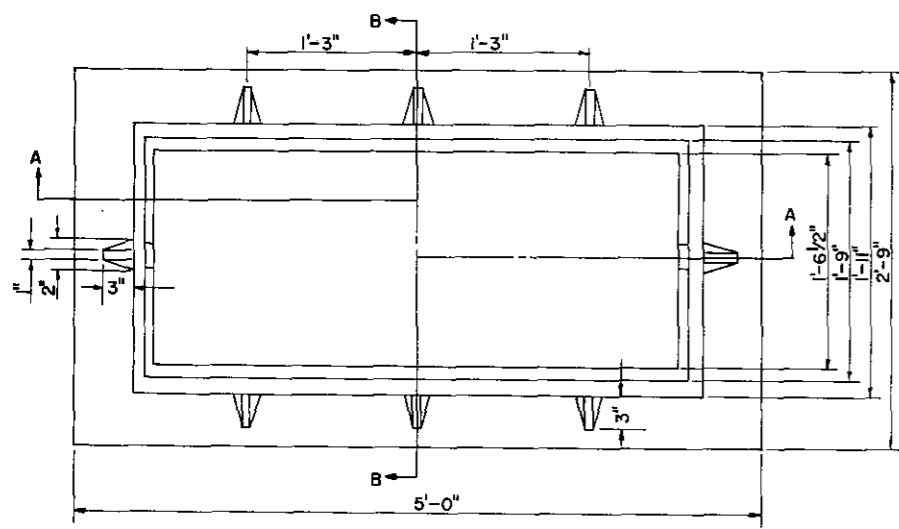
**NOTES**

Frames shall be gray, ductile or malleable iron castings.  
 Gratings shall be wrought iron, ductile cast iron or structural grade steel.  
 Fabricated gratings shall be of the materials, design and dimensions shown on this drawing.  
 Cast gratings shall be ductile cast iron of the design shown, have the same open area and sustain H-15 loading.  
 The members of the fabricated grating shall be joined by riveting as shown or by approved welding.  
 Pipe or pipes shall be located as required.  
 The exposed face of the backwall shall be constructed vertical when adjacent existing or proposed curb has a vertical face.  
 Inlet walls shall be modified similar to manhole construction (Std. Dwg. SD-6) when the diameter of the required pipe exceeds the inlet box dimensions shown.

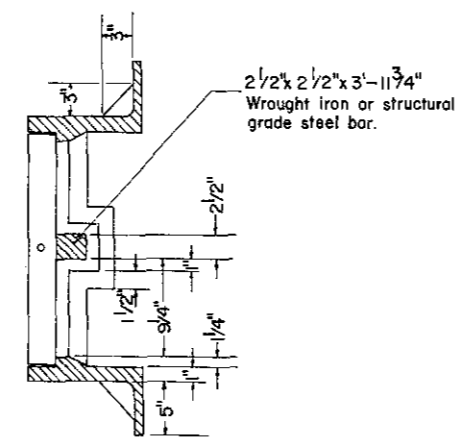


Rev. Nov. 1, 1961  
 Rev. Aug. 21, 1953

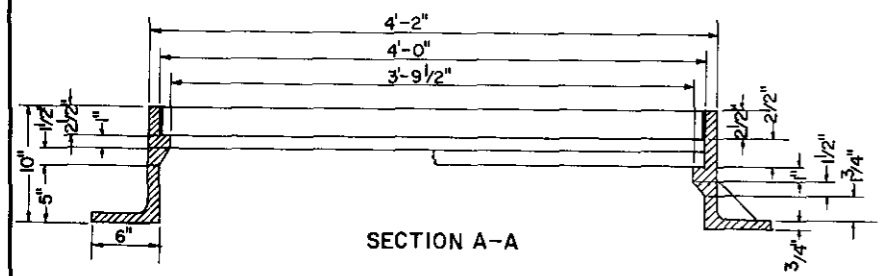
**S.I.**  
**4 & 6**



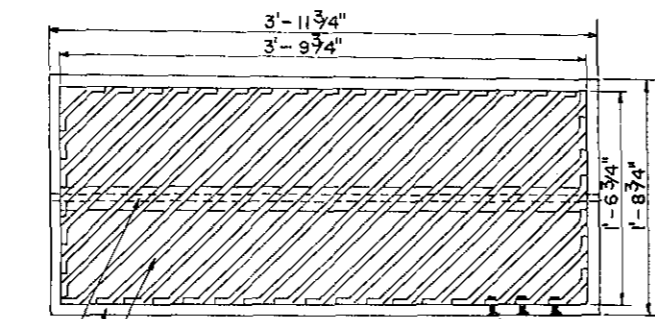
FRAME PLAN



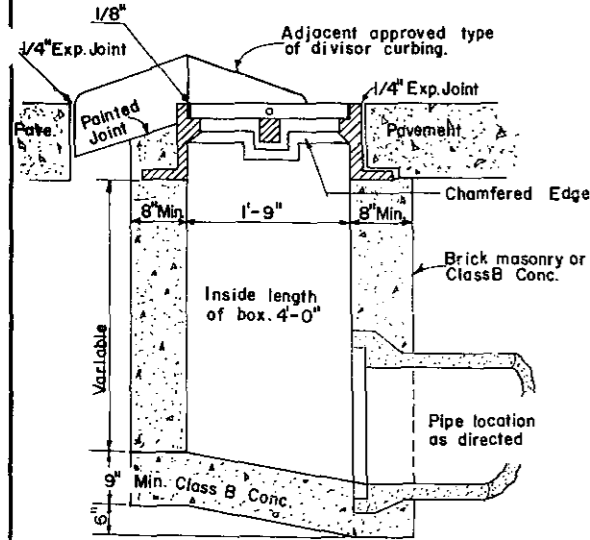
SECTION B-B



SECTION A-A



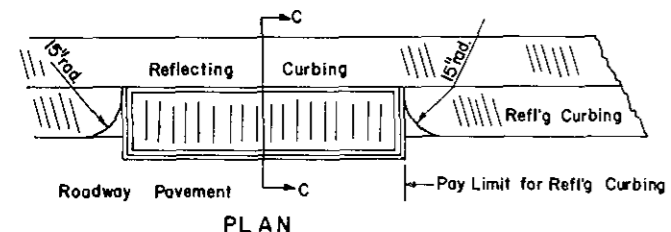
PLAN OF GRATING



SECTION C-C

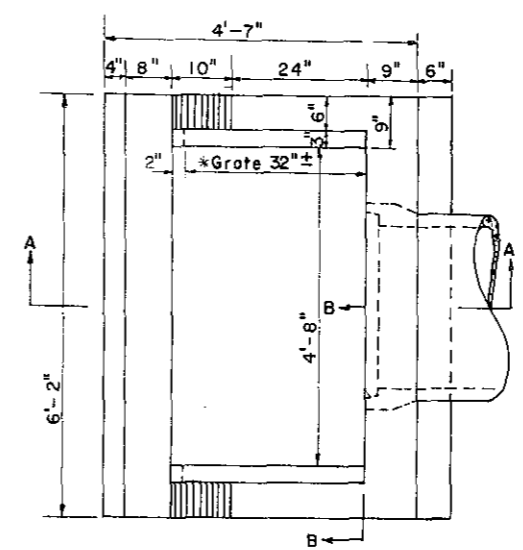
NOTES

1. Frames shall be gray, ductile or malleable iron castings.
2. Gratings shall be wrought iron, ductile cast iron or structural grade steel.
3. Fabricated gratings shall be of the materials, design and dimensions shown on this drawing.
4. Cast gratings shall be ductile cast iron of the design shown, have the same open area and sustain H-15 loading.
5. The members of the fabricated grating shall be joined by riveting as shown or by approved welding.
6. Pipe or pipes shall be located as required.
7. The exposed face of the backwall shall be constructed vertical when adjacent existing or proposed curb has a vertical face.

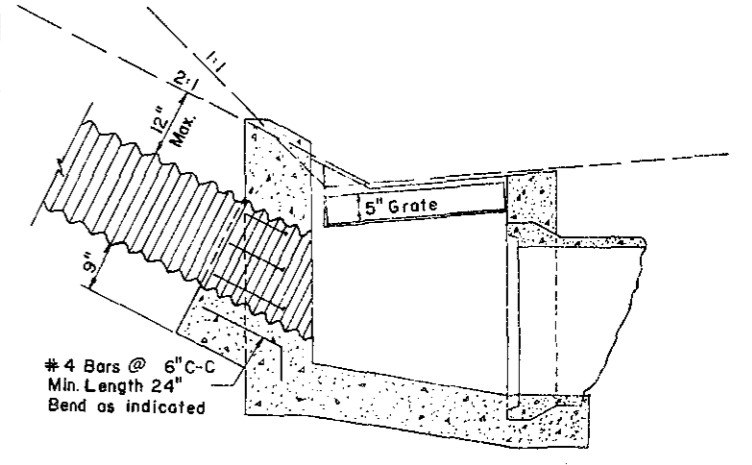


PLAN

**TYPE J INLET**

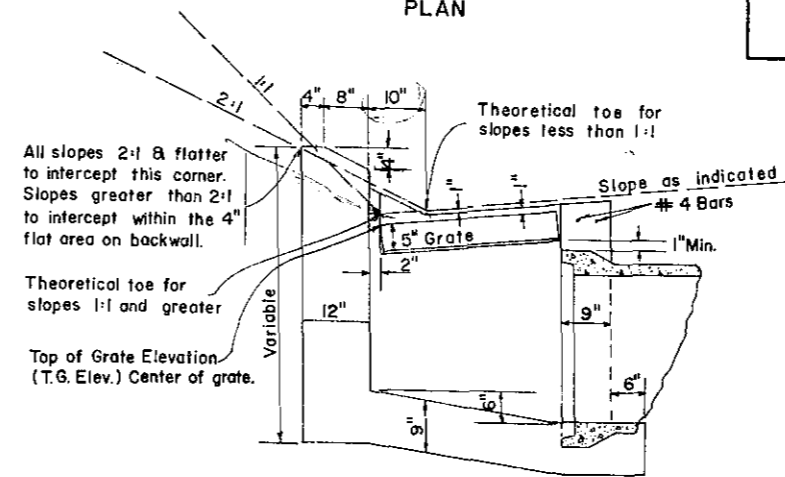


PLAN



**TYPE H-INLET MODIFIED**

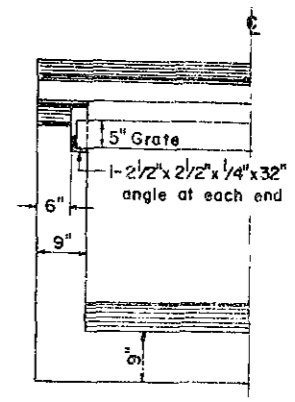
All other details shall conform to Type H Inlets



SECTION A-A

All slopes 2:1 & flatter to intercept this corner. Slopes greater than 2:1 to intercept within the 4" flat area on backwall.

Theoretical toe for slopes 1:1 and greater  
Top of Grate Elevation (T.G. Elev.) Center of grate.



HALF-SECTION B-B

NOTES

1. Construct inlet box of Class B concrete. Chamfer exposed edges one (1) inch.
2. Pipe location or locations shall be as directed.
3. All reinforcement bars shall be #4, placed 2 1/2" from face of concrete.
4. Longitudinal bars (2 Ea.) are 5'-10" long.
5. Bent bars in backwall are 3'-0" long at 12" C-C bent as indicated.
6. \* Variable - Depending on design of grate approximate 32" lg.
7. Grates shall be of the types shown on Supplement Sheet A or approved equal to sustain H-15 loading.

NOTE - ALL INLETS

Inlet walls shall be modified similar to manhole construction (Std. Dwg. SD-6) when the diameter of the required pipe exceeds the inlet box dimensions shown.

**TYPE H INLET**

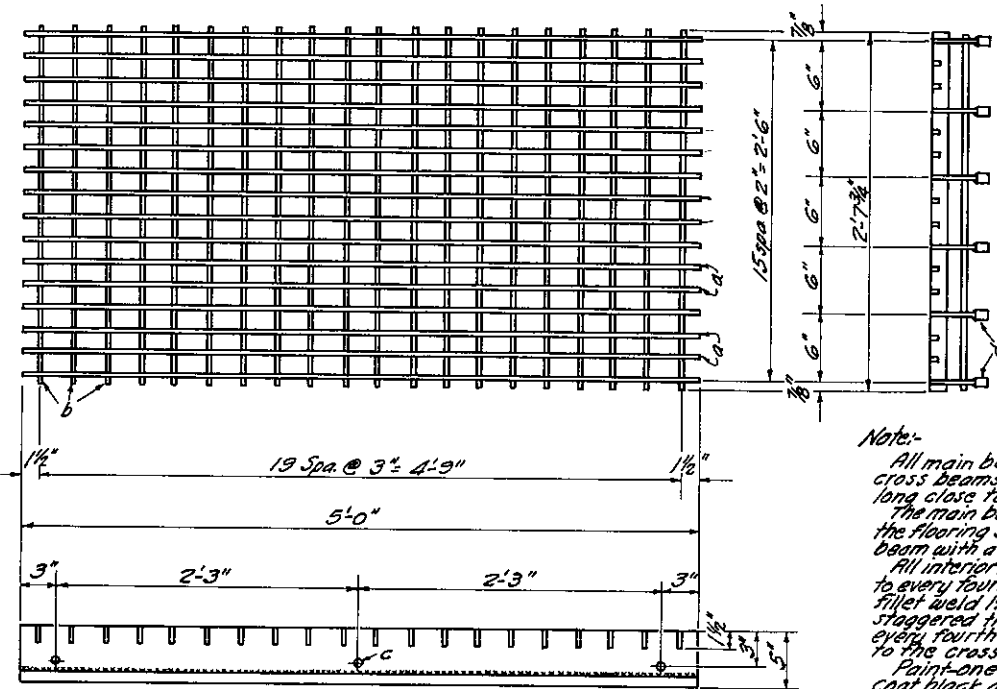
Redrawn and approved \_\_\_\_\_ MAY 8, 1968  
Revised Type H-Inlet.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

TYPE H & TYPE J INLETS

APPROVED \_\_\_\_\_ MAY 8, 1968  
\_\_\_\_\_ CHIEF ENGINEER

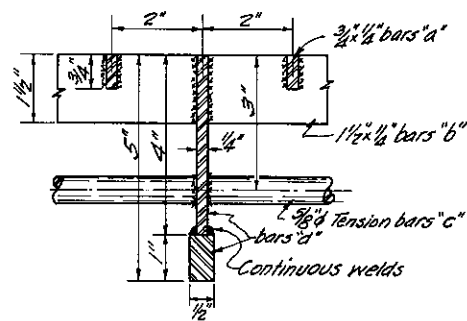
MISC. INLETS



**Note:-**  
 All main bars shall be welded to the cross beams with a  $\frac{1}{4}$ " fillet weld  $1\frac{1}{2}$ " long close to the end of the bar.  
 The main bar along the outer edge of the flooring shall be welded to each cross beam with a fillet weld  $1\frac{1}{2}$ " long.  
 All interior main bars shall be welded to every fourth cross beam with a  $\frac{1}{4}$ " fillet weld  $1\frac{1}{2}$ " long and with welds so staggered that at each cross beam every fourth main bar will be welded to the cross beam.  
 Paint one coat red lead and one coat black asphaltic paint.

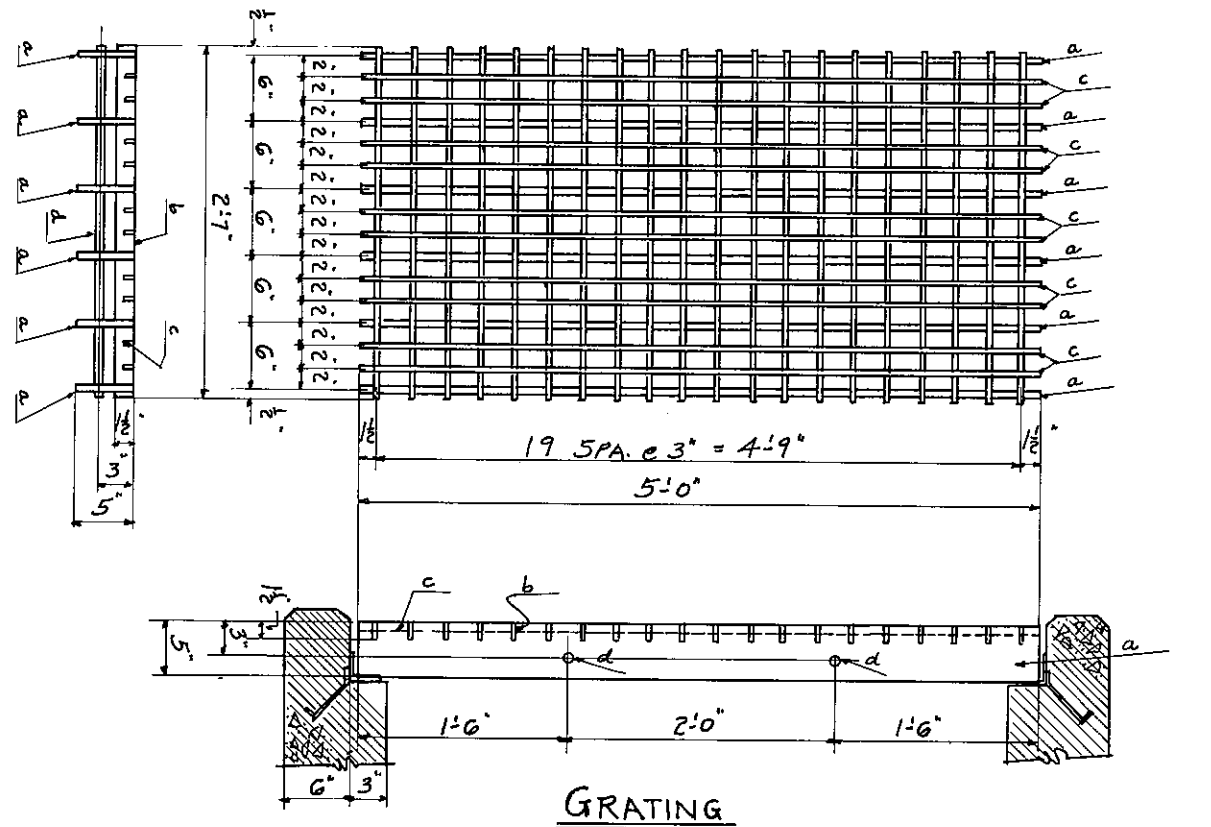
| MATERIAL FOR ONE GRATE * |           |                                   |                      |
|--------------------------|-----------|-----------------------------------|----------------------|
| Mark                     | No. Req'd | Section                           | Length               |
| a                        | 10        | $\frac{3}{4}$ " x $\frac{1}{2}$ " | 5' 0"                |
| b                        | 20        | $\frac{1}{2}$ " x $\frac{1}{2}$ " | 2' 7 $\frac{3}{4}$ " |
| c                        | 3         | $\frac{5}{8}$ " $\phi$ bars       | 2' 6 $\frac{3}{4}$ " |
| d                        | 6         | 4" x $\frac{1}{4}$ "              | 5' 0"                |
|                          | 6         | 1" x $\frac{1}{2}$ "              | 5' 0"                |

\* In addition, support angles are required in accordance with Std. Dwg. "MISC. INLETS."

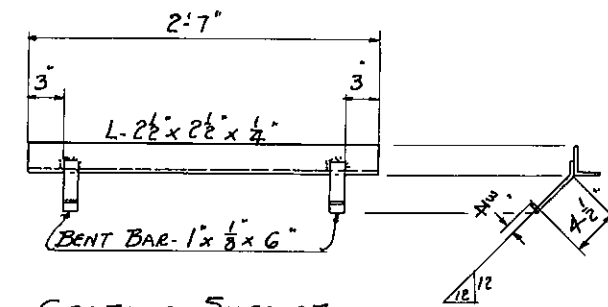


ALTERNATE  
 GRATE ASSEMBLY  
 FOR  
 TYPE H INLET

Manufactured by  
 Edmund A. Quirin Machine Shop & Foundry  
 St. Clair, Pa.



GRATING



GRATING SUPPORT  
 2 FOR EACH GRATING.

| BILL OF MATERIAL |       |  |
|------------------|-------|--|
| MARK             | REQ'D | DESCRIPTION                                    |
| a                | 6     | BAR- 5" $\frac{1}{2}$ " x 5' 0"                |
| b                | 20    | BAR- $\frac{1}{2}$ " x $\frac{1}{2}$ " x 2' 7" |
| c                | 10    | BAR- $\frac{3}{4}$ " x $\frac{1}{2}$ " x 5' 0" |
| d                | 2     | ROD- $\frac{3}{4}$ " $\phi$ x 2' 7"            |

SHOP PAINT - ONE COAT

ALTERNATE  
 GRATE ASSEMBLY  
 FOR  
 TYPE H INLET

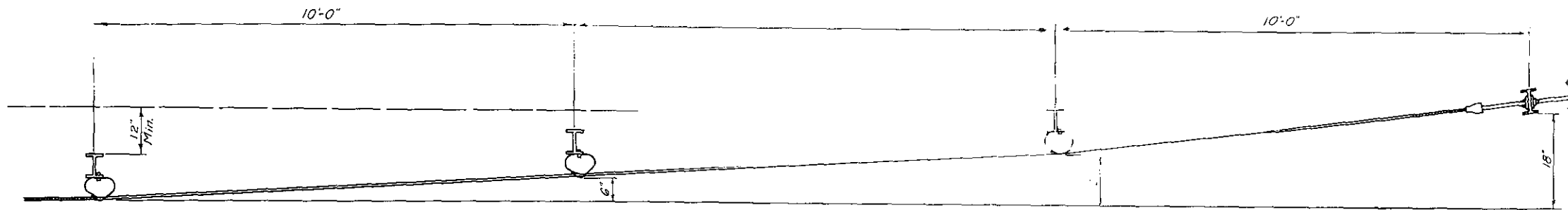
Manufactured by  
 Scottdale Machine, Foundry & Construction Co.  
 Scottsdale, Pa.

Revised for Addition of  
 "Quirin" Grate Assembly.  
 Approved:  
 July 20, 1955  
 Approved Feb. 5, 1954  
 ASST. CHIEF ENGR. IN CHARGE OF DESIGN

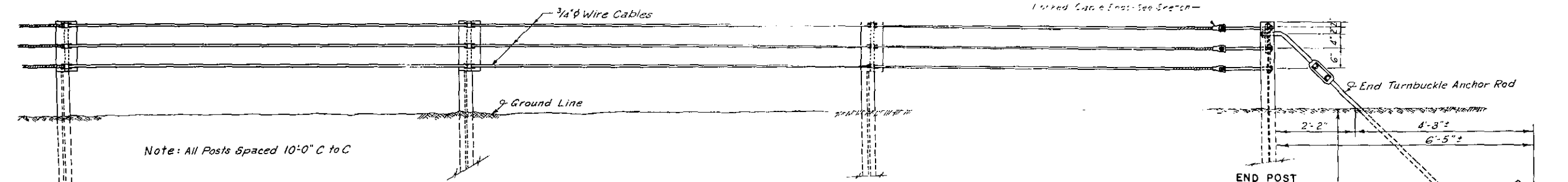
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS

MISCELLANEOUS INLETS-  
 SUPPLEMENTAL SHEET A

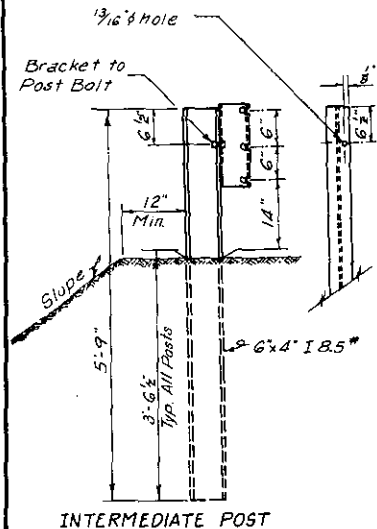




PLAN

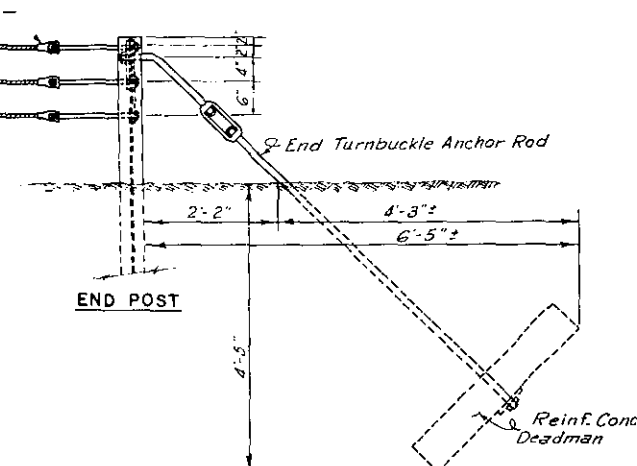


ELEVATION

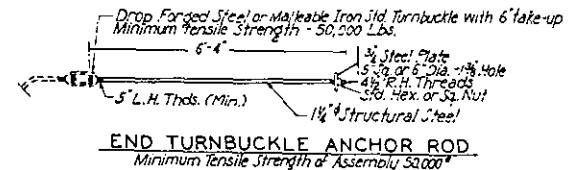


INTERMEDIATE POST

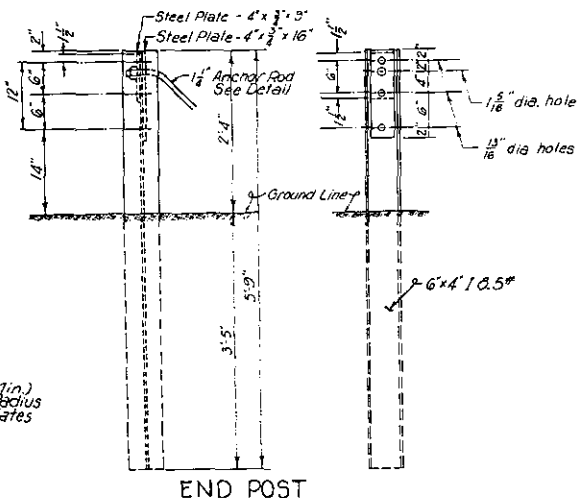
INTERMEDIATE POST



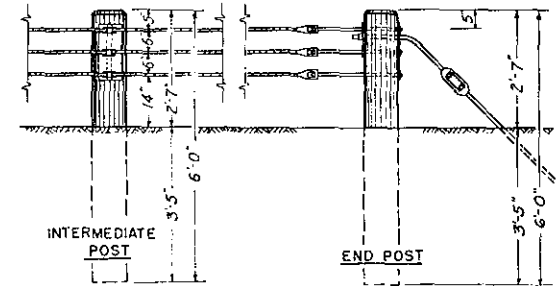
END POST



END TURNBUCKLE ANCHOR ROD

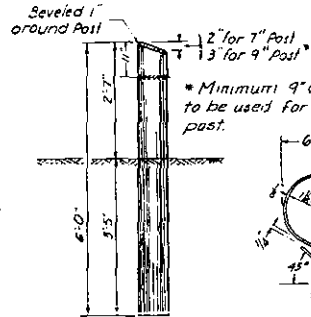


END POST

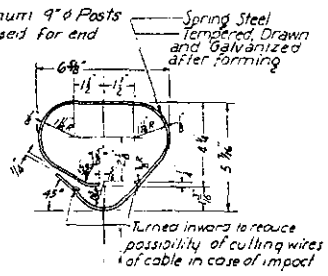


INTERMEDIATE POST

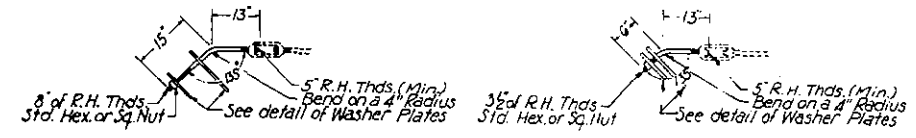
END POST



Seveled 1" round Post



SPRING BLANK

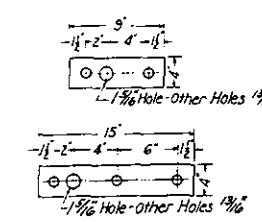


FOR WOOD POSTS

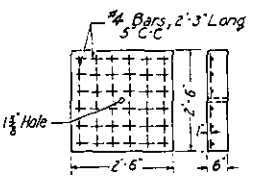
FOR STEEL POSTS

BENT SECTIONS OF END TURNBUCKLE ANCHOR RODS

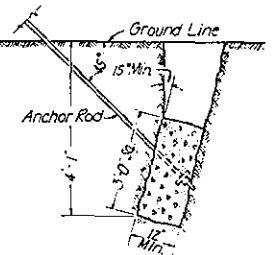
WOOD POSTS INSTALLATION



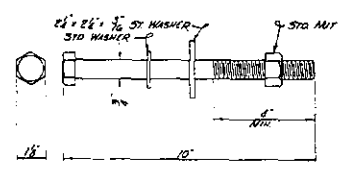
WASHER PLATES



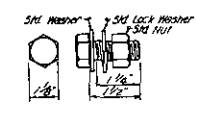
REINF. CONC. DEADMAN



ALTERNATE CONC. DEADMAN

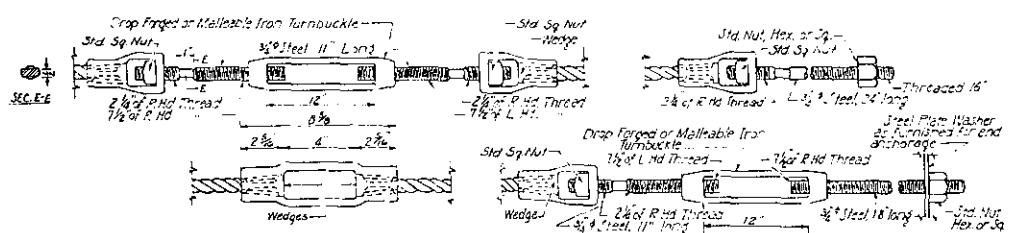


FOR WOOD POSTS



FOR STEEL POSTS

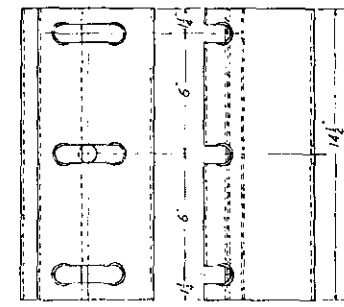
BRACKET TO POST BOLTS



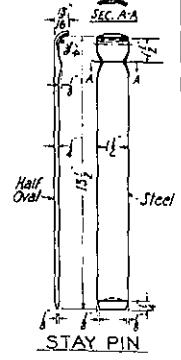
CABLE SPLICES

CABLE ENDS

NOTE: Cable Splices and Cable Ends shall be positive and of any type and design coinciding with the intent, design and strength of the structure, and meeting with the approval of the Engineer.



OFFSET SPRING BRACKETS



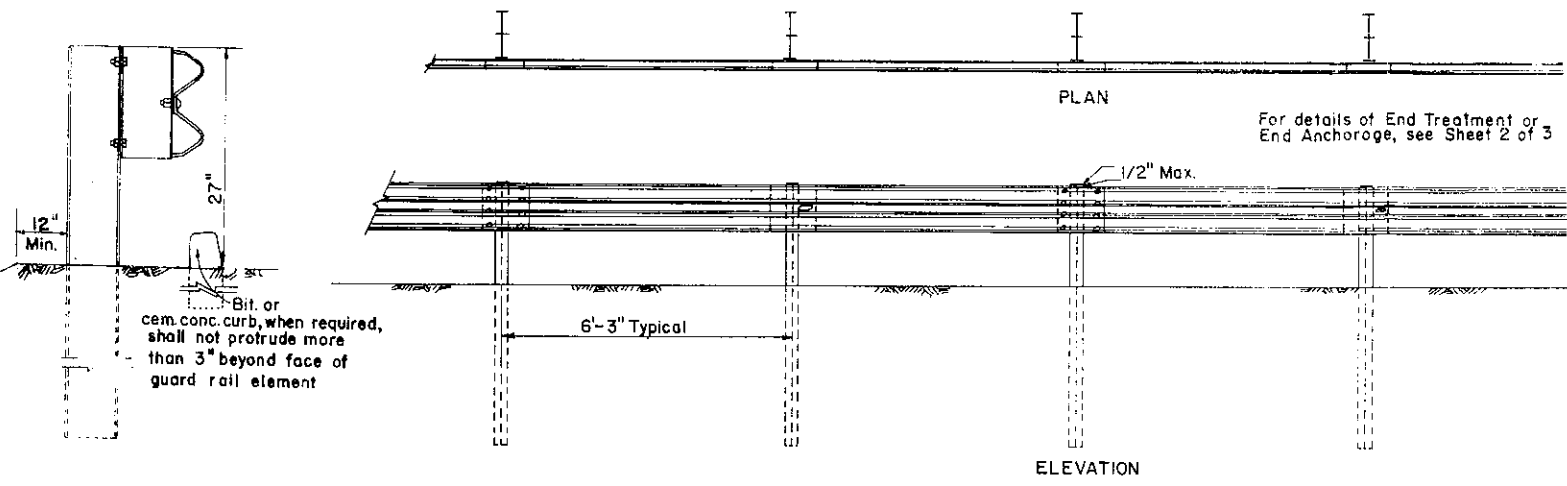
STAY PIN

NOTE: All metal shall be galvanized unless otherwise specified.

NOTE: The American Steel and Wire Company has waived all claims for royalty or other indemnity under Letters Patent of the United States, which have been issued or for which applications are pending, on this guard rail insofar as the Commonwealth of Pennsylvania or any of its political subdivisions using said guard rail on projects under the supervision of said Commonwealth are concerned, either directly or through contractors on work for the Commonwealth or such political subdivision.

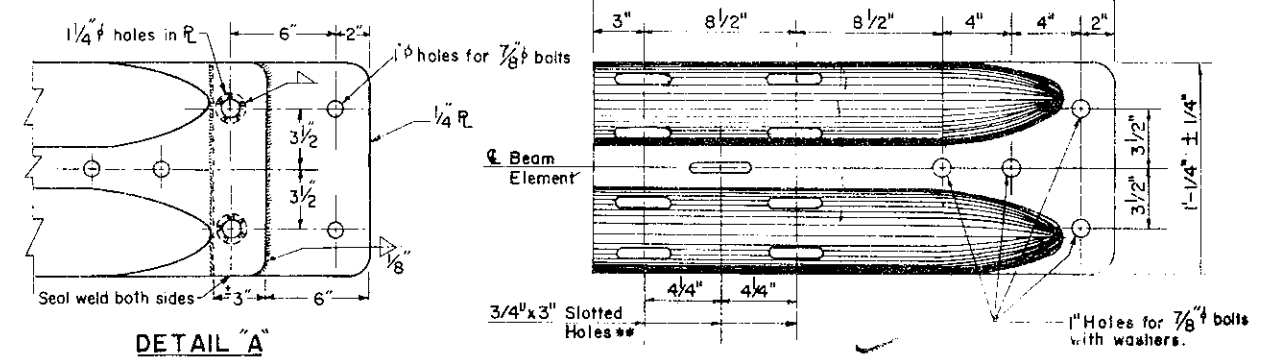
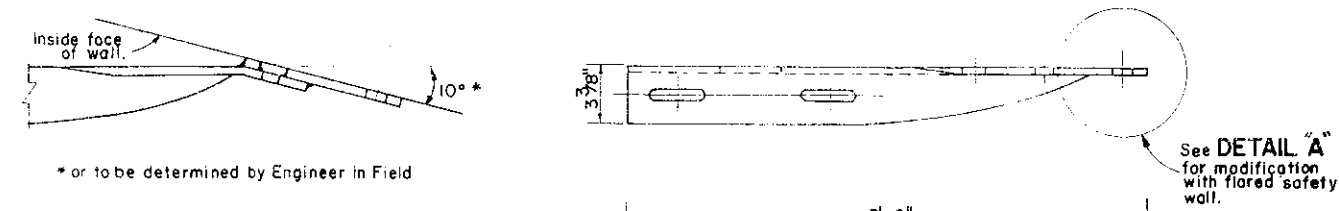
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
**TYPE I-B GUARD RAIL**  
(3 WIRE CABLES-FULL FLOATING)  
APPROVED February 5, 1968  
M. Rudolph  
CHIEF ENGINEER

GR-1



**TYPE 2-A**  
10 Ga. (U.S. Std.) Beam 100,000 lbs.

**TYPE 2-B**  
12 Ga. (U.S. Std.) Beam 80,000 lbs.



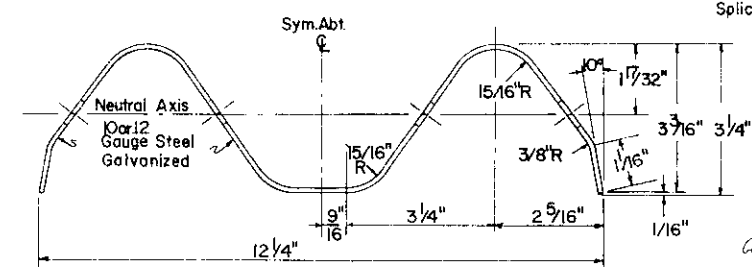
**DETAIL A**  
The Bridge Connection Terminal Modification may be fabricated as one piece to eliminate welding.

**TERMINAL SECTION BRIDGE CONNECTION**

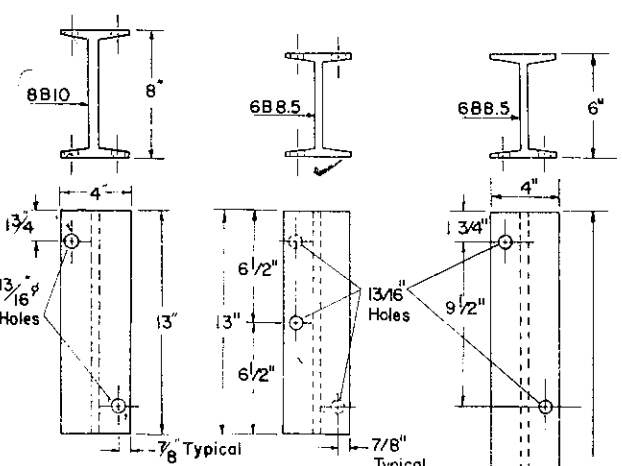
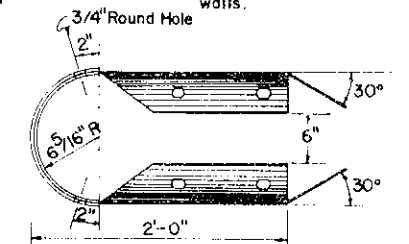
Min. 10 Ga. (U.S. Std.)  
 \*\* Splice bolts shall be provided with a lock nut or double nut and shall be tightened only to a point that will allow guard rail to be free to move. Splice bolts shall be centered in the slotted holes.

**GENERAL NOTES**

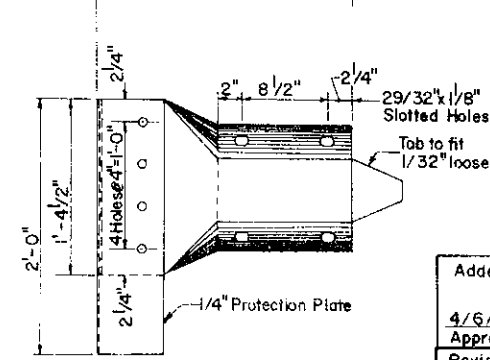
1. All materials shall conform to the requirements of Form 408.
2. Splice bolts shall develop the design strength of the rail element.
3. Post bolts shall withstand a 5000 pound side pull in either direction, without rupture.
4. Where guard rail is required on curves of less than 150 feet radius, the rail element shall be shop formed.
5. No additional compensation will be allowed for providing Terminal Section Bridge Connection with welded plate for flared walls.



**SECTION THRU RAIL ELEMENT**



**OFFSET BRACKETS**

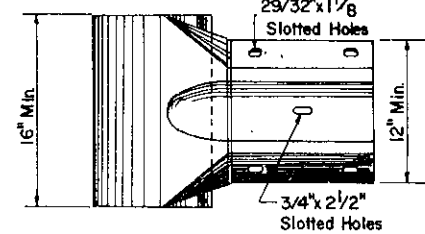
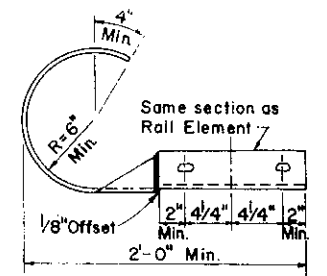


**TERMINAL SECTION (DOUBLE)**  
Min. 10 Ga. (U.S. Std.)

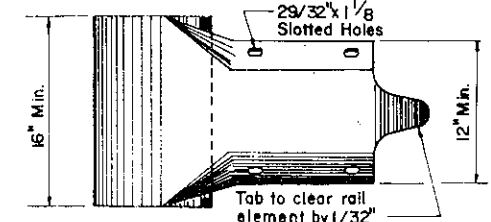
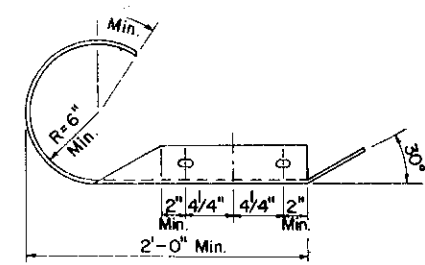
Added Sheet 4 of 4.  
 4/6/70 *W. Anselmi*  
 Approved Chief Engineer  
 Revised Terminal Section Bridge Connection  
 7/18/68 *W. Anselmi*  
 Approved - Chief Engineer

**COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 TYPE 2A & 2B GUARD RAIL**

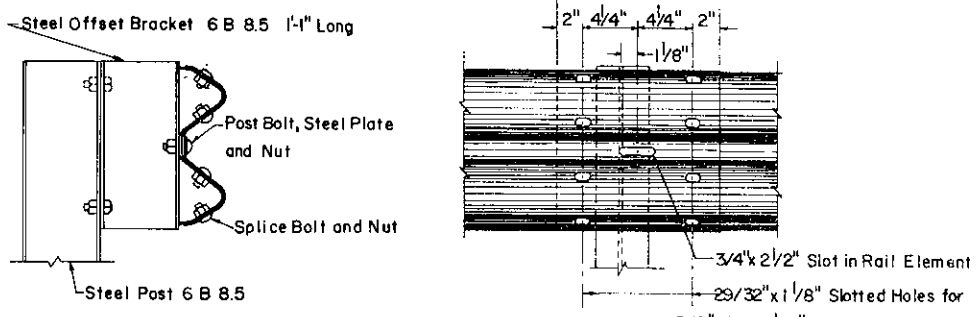
APPROVED *W. Anselmi* MAY 8, 1968  
 CHIEF ENGINEER



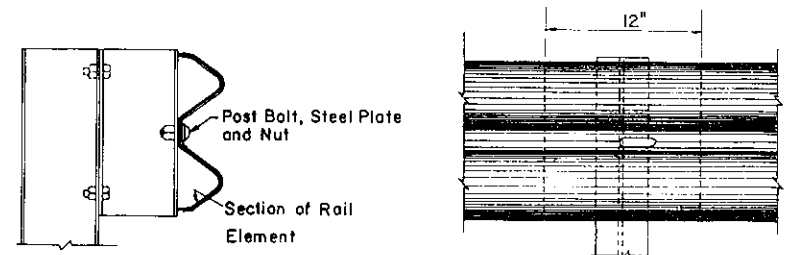
**TERMINAL TO BE PLACED ON BACK OF RAIL ELEMENT**



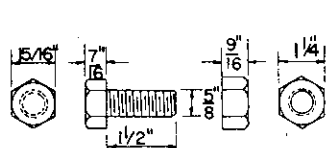
**ALTERNATE TERMINAL SECTIONS (SINGLE)**  
Min 12 Ga. (U.S. Std.)



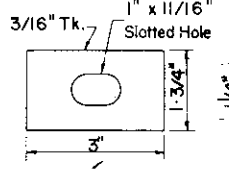
**TYPICAL RAIL SPLICE**



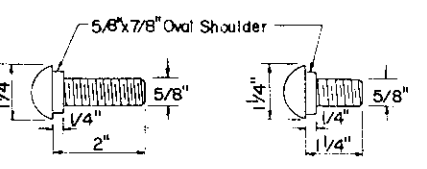
**TYPICAL RAIL BACKING PLATE**



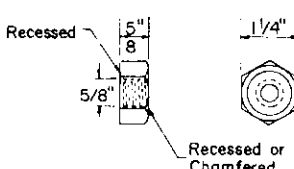
**BRACKET TO POST**



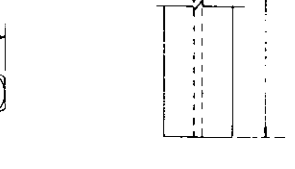
**STEEL PLATE**



**POST BOLT**

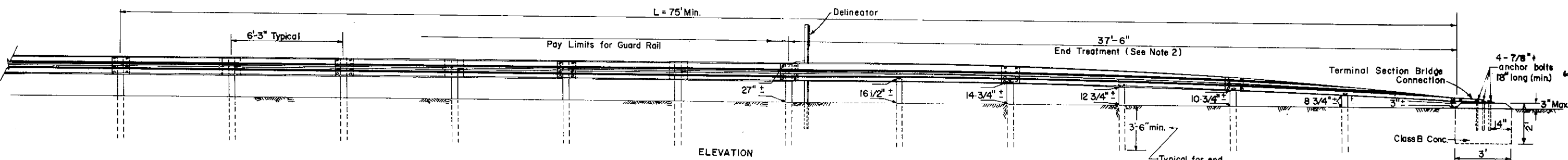
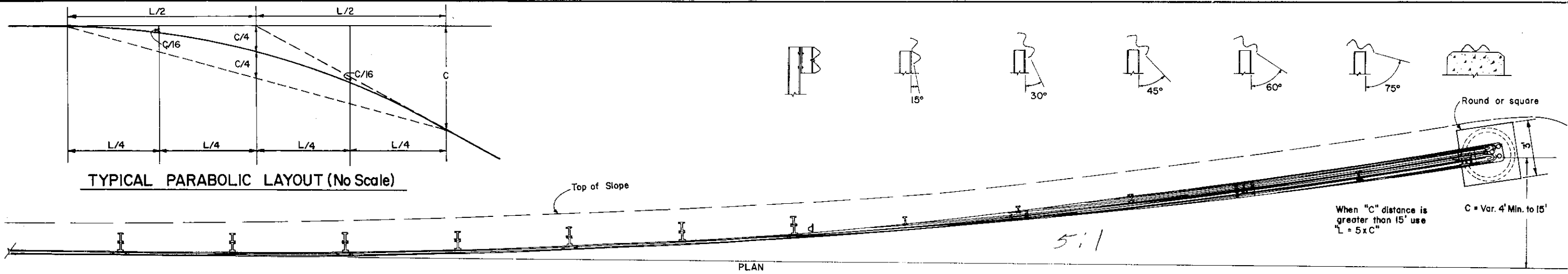


**SPLICE BOLT**

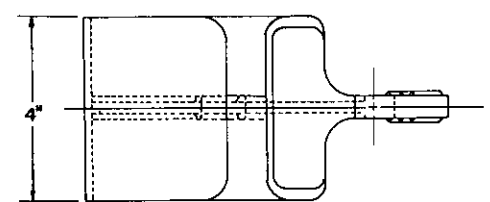


**NUT**

**POST DETAIL**

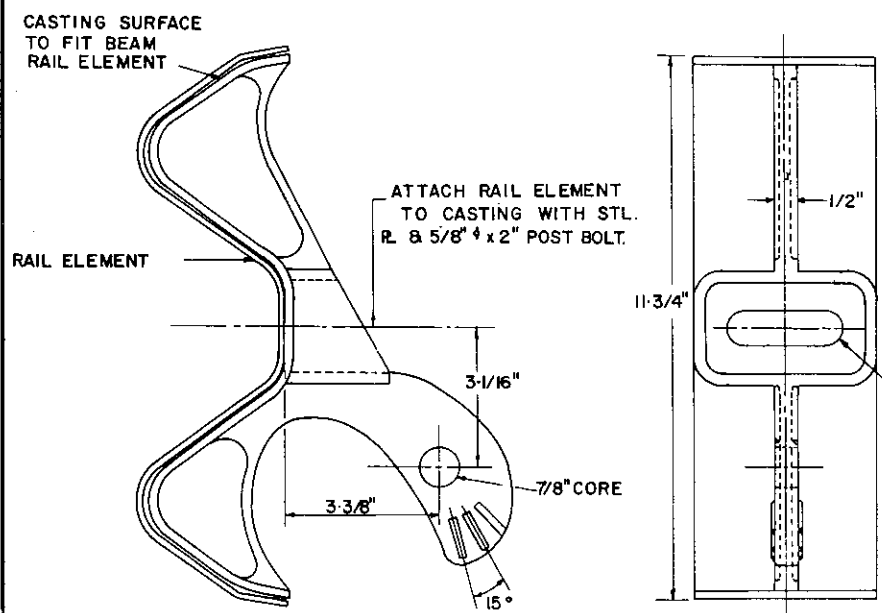


**TYPE 2-A AND 2-B GUARD RAIL END TREATMENT (Fill Condition)**

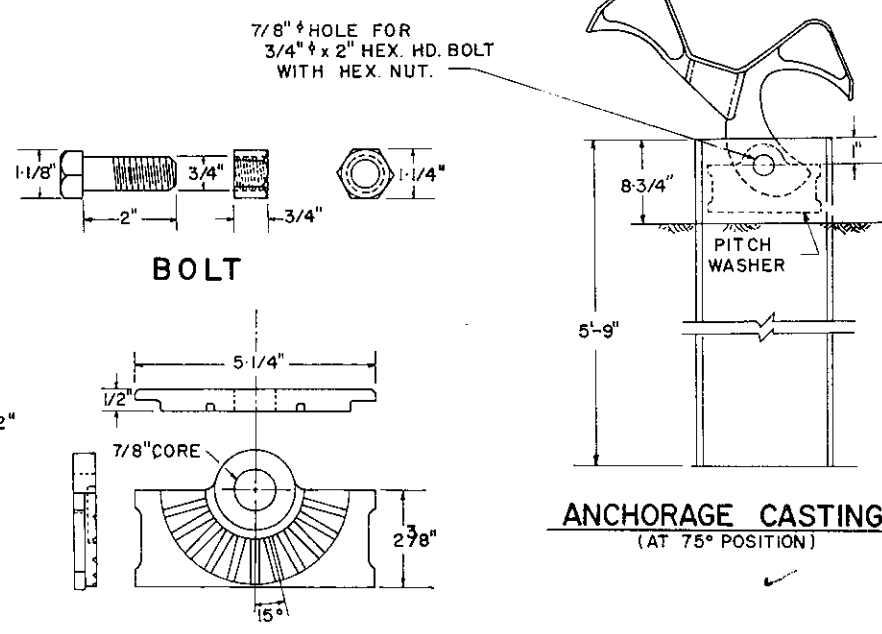


**NOTES**

1. Flare offset (C) to be a minimum of 4', actual dimensions to be determined by the engineer to meet field condition.
2. Payment for End Treatment shall include the last 37-1/2 linear feet of sloping rail, terminal section, hardware, and Class B Concrete.
3. Other types of rotating brackets may be used as approved by the Engineer.



**ANCHORAGE CASTING\***



**PITCH WASHER\***

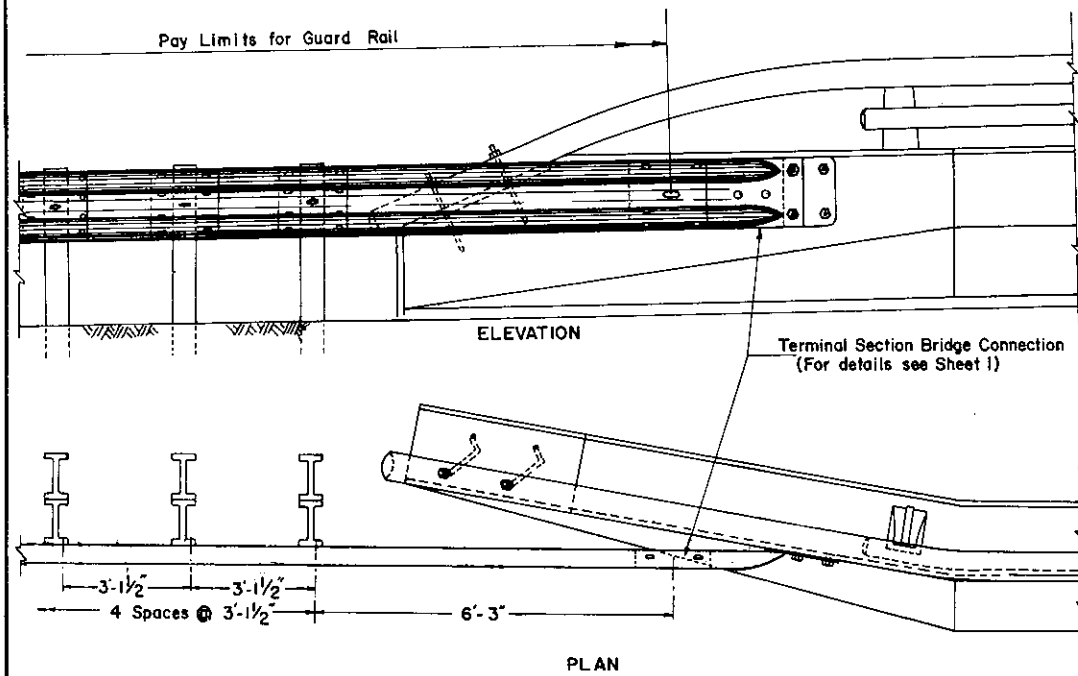
1/6/70  
7/18/62  
MAY 8 1968

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS**

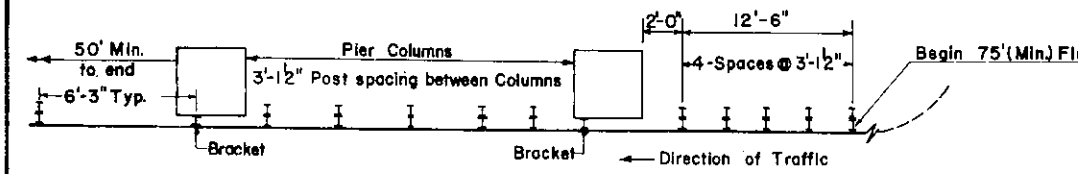
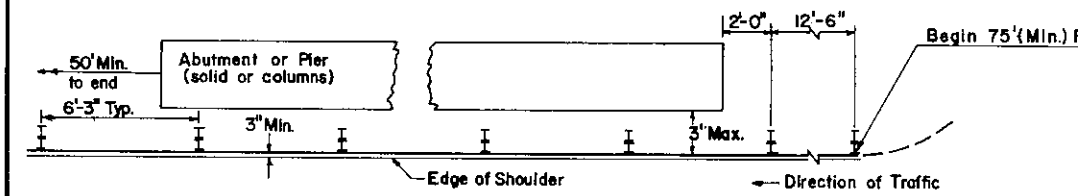
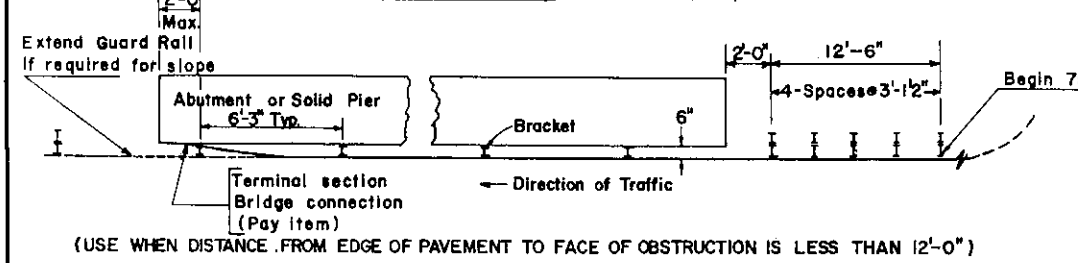
**TYPE 2A & 2B GUARD RAIL**

SHEET 2 OF 4  
**GR-2**

\* Malleable cast iron ASTM A-47 Grade 35018 and galvanized in accordance with AASHTO designation M III

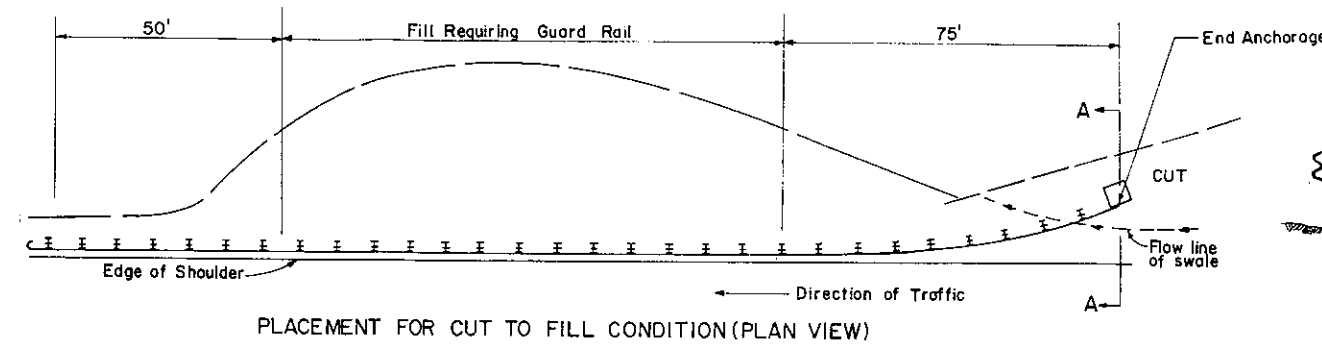


**GUARD RAIL TO PARAPET CONNECTION**

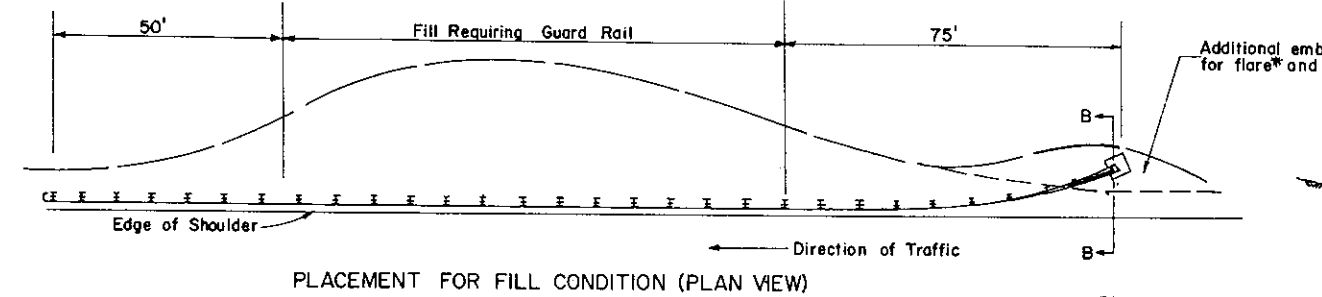


(USE WHEN DISTANCE FROM EDGE OF PAVEMENT TO FACE OF OBSTRUCTION IS LESS THAN 12'-0" WITH PIER COLUMNS)

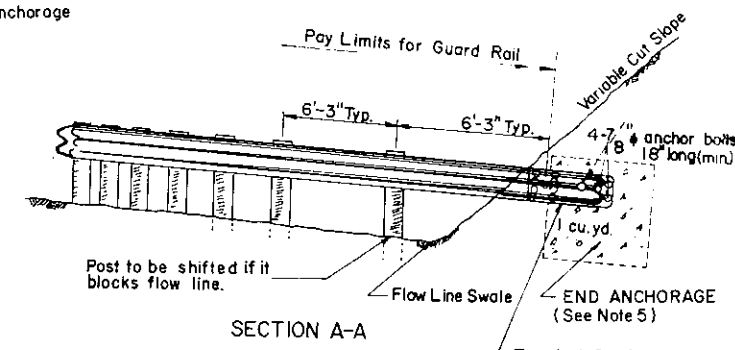
**GUARD RAIL PLACEMENT FOR PIERS & ABUTMENTS**



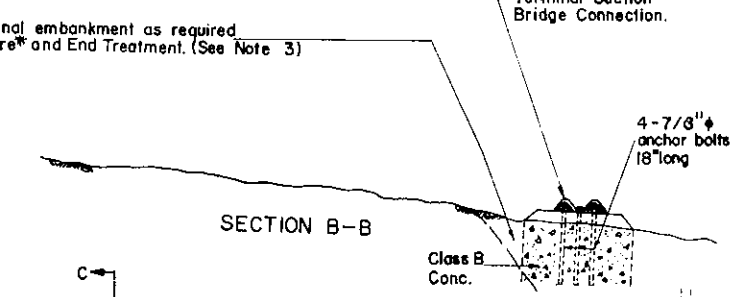
PLACEMENT FOR CUT TO FILL CONDITION (PLAN VIEW)



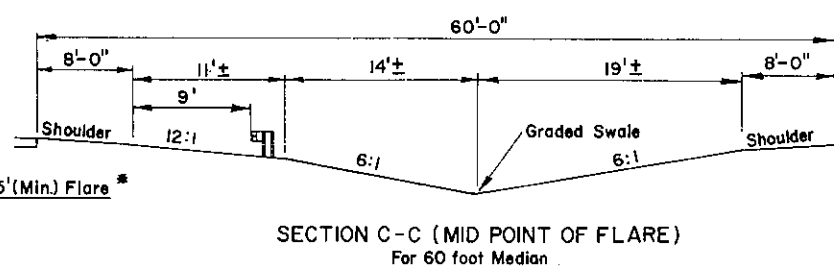
PLACEMENT FOR FILL CONDITION (PLAN VIEW)



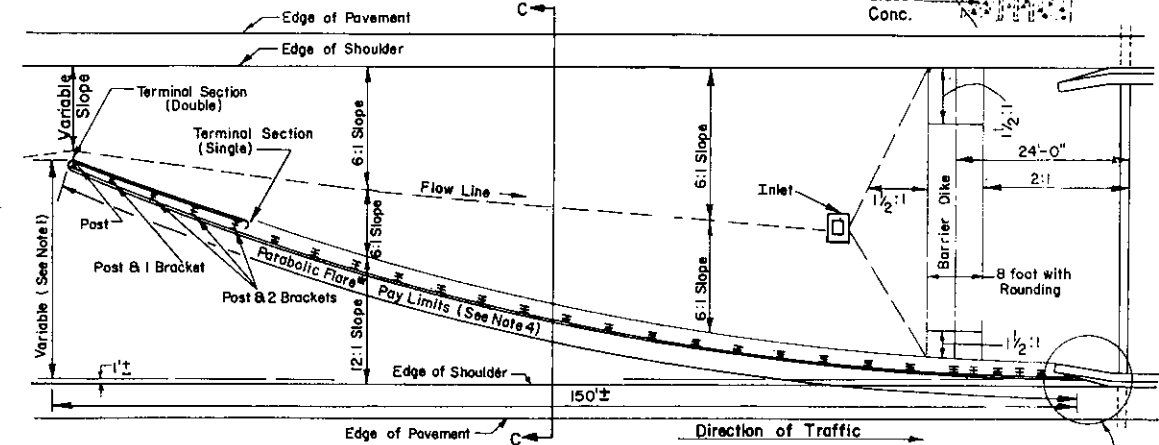
SECTION A-A



SECTION B-B

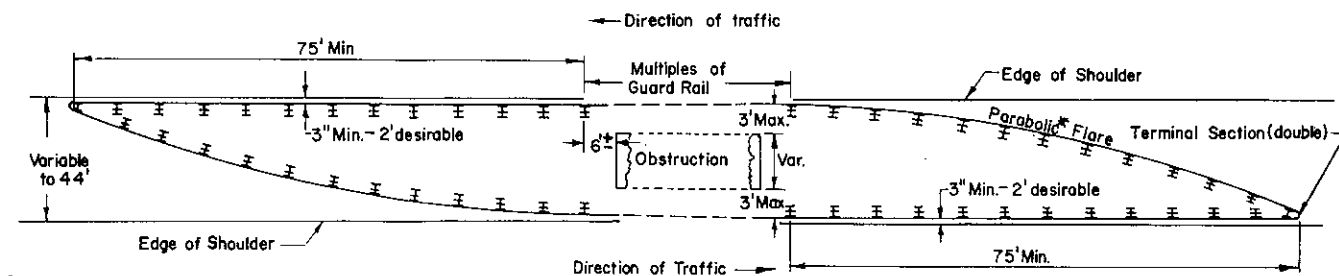


SECTION C-C (MID POINT OF FLARE)  
For 60 foot Median



**PLACEMENT WITH ADJACENT STRUCTURES**

See Guard Rail to Parapet connection.



**PLACEMENT WITH MEDIAN OBSTRUCTION**

When 3" clearance between edge of Shoulder and face of Guard Rail Element cannot be maintained, attach offset brackets to obstruction and provide 3'-1/2" post spacing for four (4) spaces on both approach sides, similar to Guard Rail Placement for Piers and Abutments.

\*Refer to Sheet 2 for Parabolic Layout.

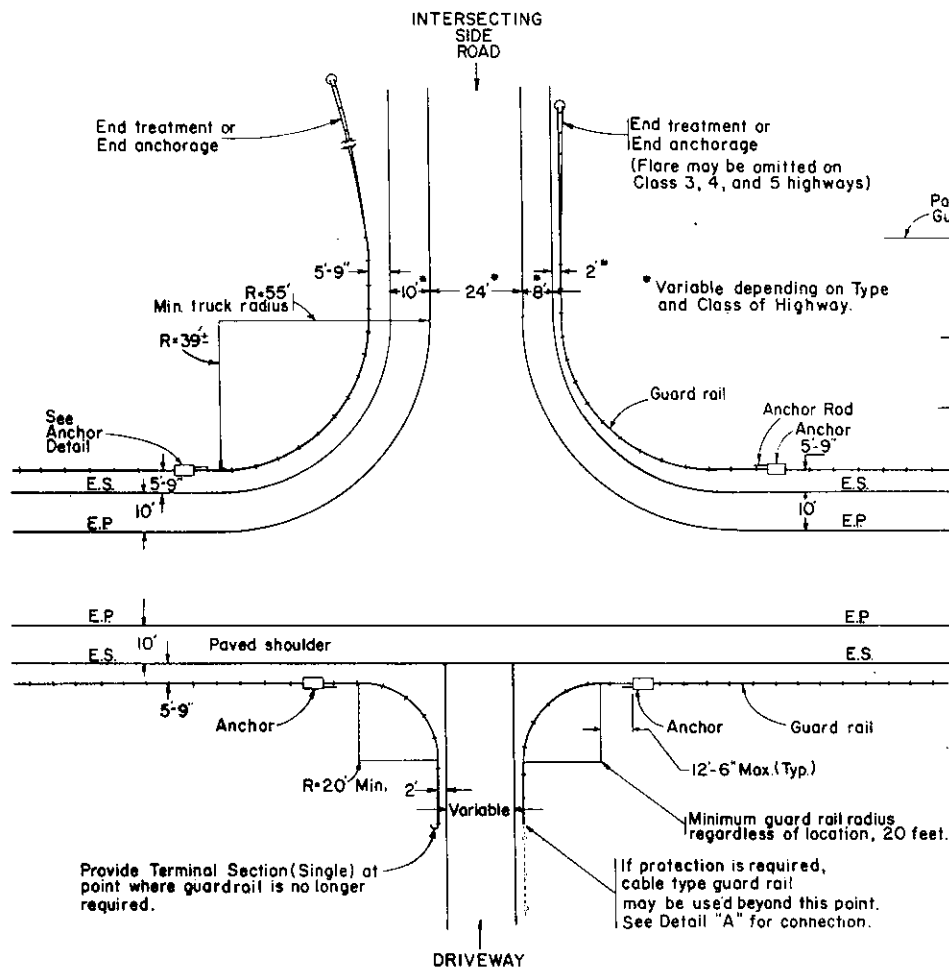
**NOTES**

1. This offset to be 32 feet for median widths of 60 feet or more, and 16 feet for medians less than 60 feet.
2. This standard has been prepared as a guide for the placement of guard rail. It is impractical to provide a standard for all possible conditions, therefore modifications for each situation will have to be carefully made, as directed in the field.
3. The additional embankment as required for flare and end treatment shall be constructed at the same time as the embankment.
4. The 25 foot return section of rail element, on the back, will not be measured.
5. Payment for end anchorage shall include excavation, class B concrete, terminal section bridge connection, and anchor bolts.
6. No separate or additional payment will be made for additional post or block outs for 3'-1/2" post spacing.

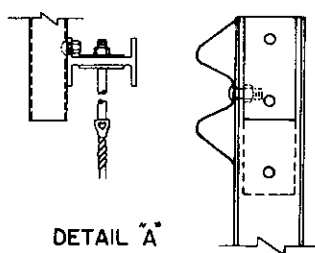
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

**TYPE 2A & 2B GUARD RAIL**

4/6/70  
5/18/68  
MAY 8 1968

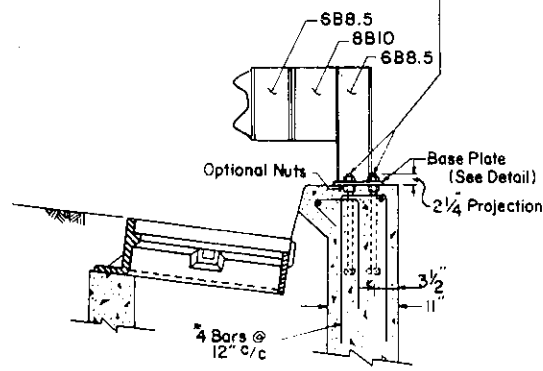


GUARD RAIL TREATMENT-INTERSECTIONS

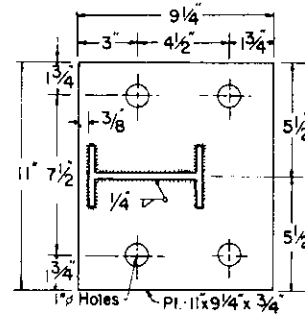


See GR-1 for details not shown. Type I End Anchorage not required.

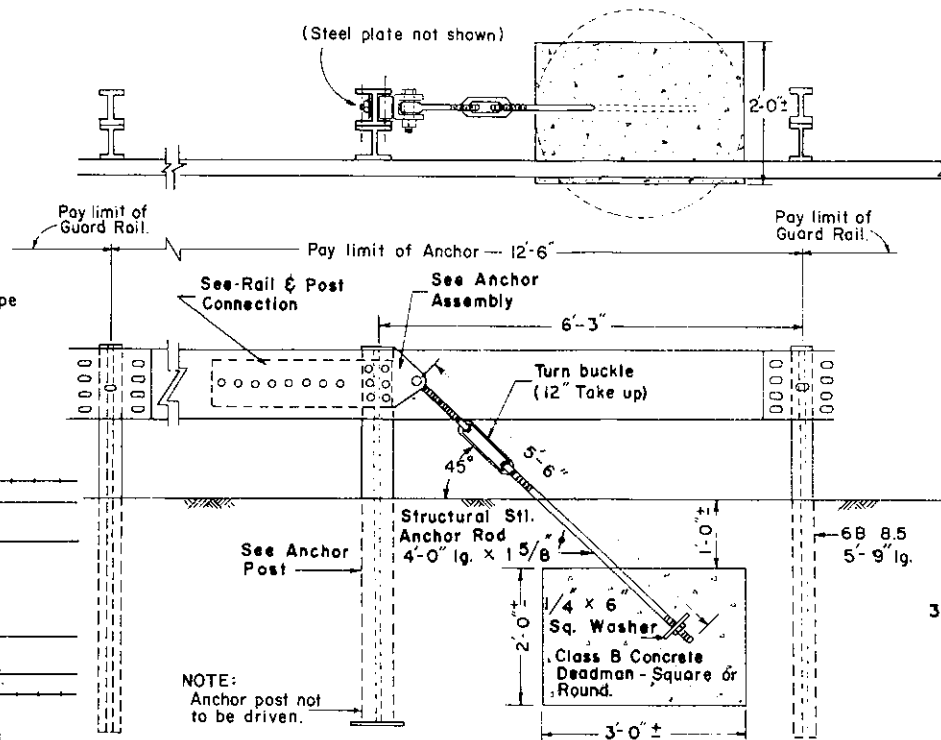
4 - 7/8" x 1'-0" Anchor bolts, with square or hex head, 3 1/2" thd., hex nut, and plate washer. (For alternate type anchorage detail, refer to Standard Drawing ST 334)



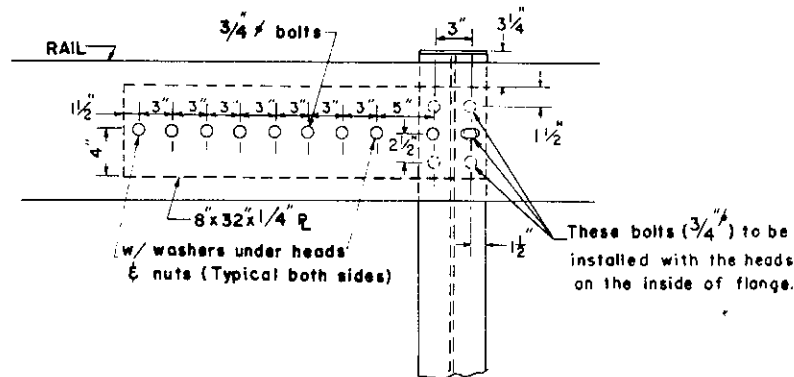
GUARD RAIL CONNECTION to 4 FT. or 6 FT. SPECIAL INLET MODIFIED



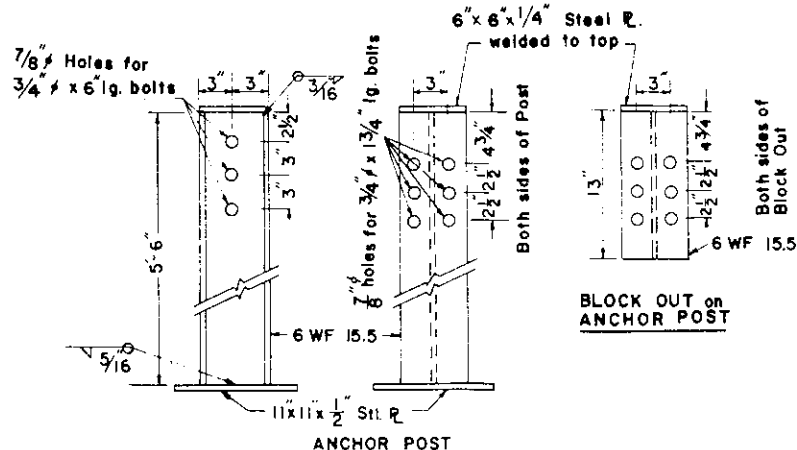
BASE PLATE DETAIL



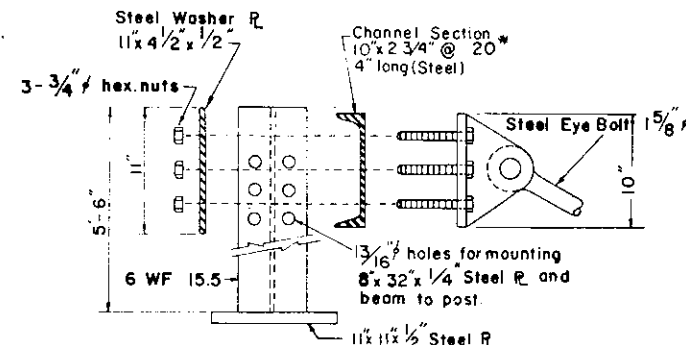
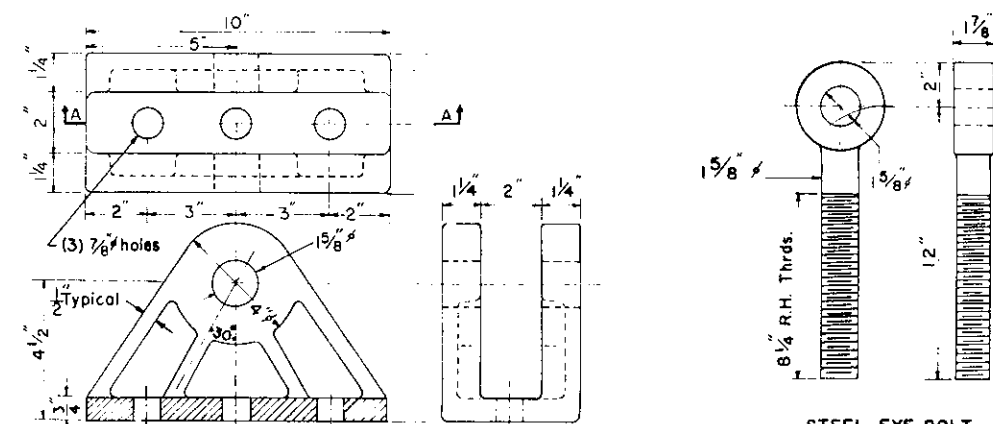
ANCHOR DETAIL



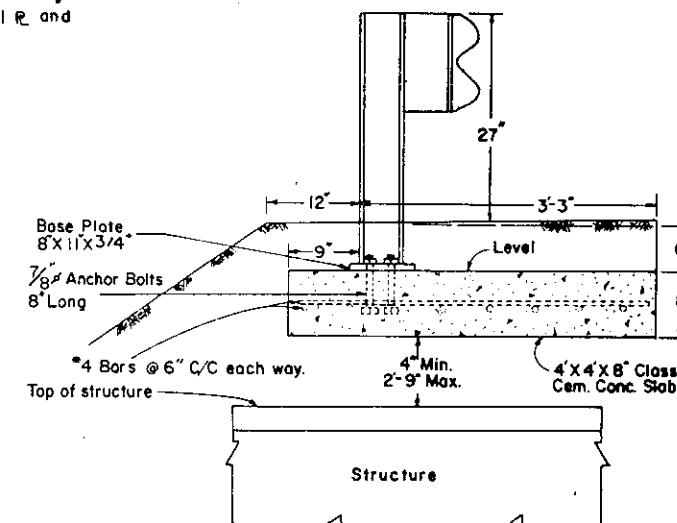
RAIL & POST CONNECTION



ANCHOR POST



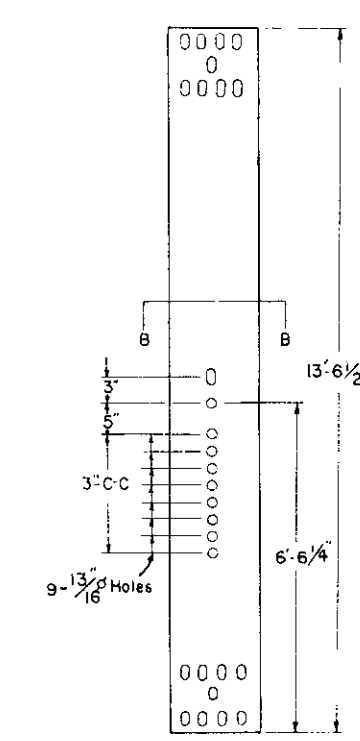
ANCHOR ASSEMBLY



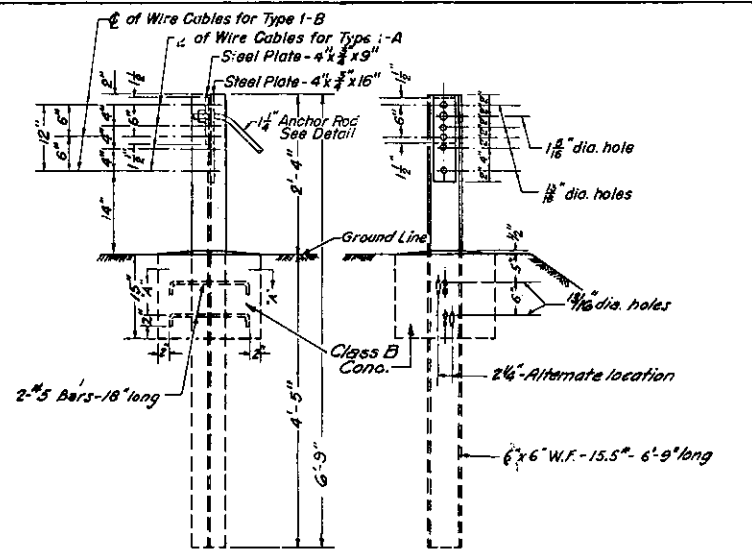
GUARD RAIL OVER UNDERGROUND STRUCTURES

NOTES

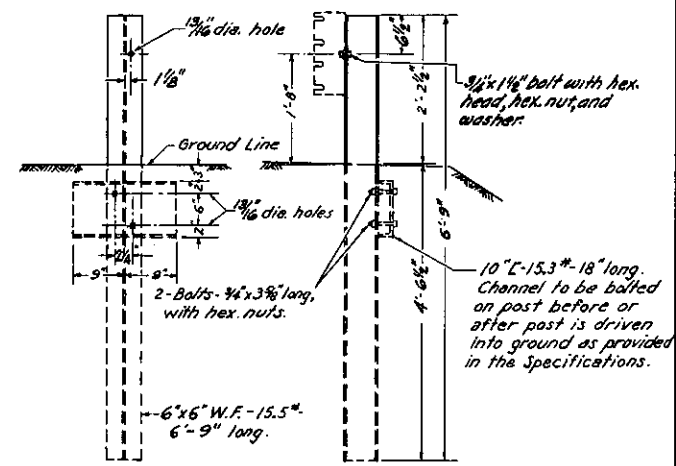
Payment for Anchor shall include a 12'-6" section of specially punched rail element, turnbuckle, related hardware, anchor post, blockout, and Class B Concrete.



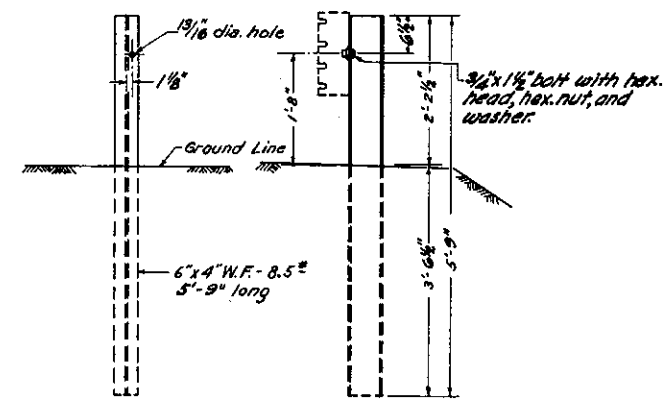
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
TYPE 2A & 2B GUARD RAIL



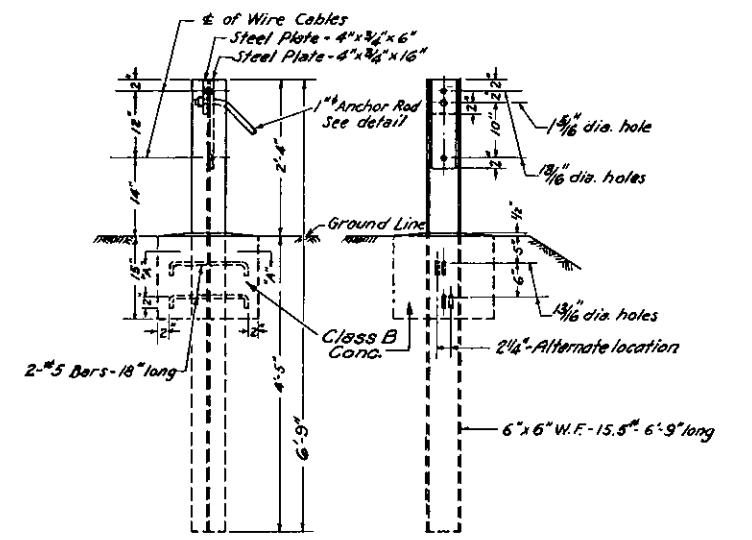
DRIVEN END POST FOR TYPES 1-A AND 1-B



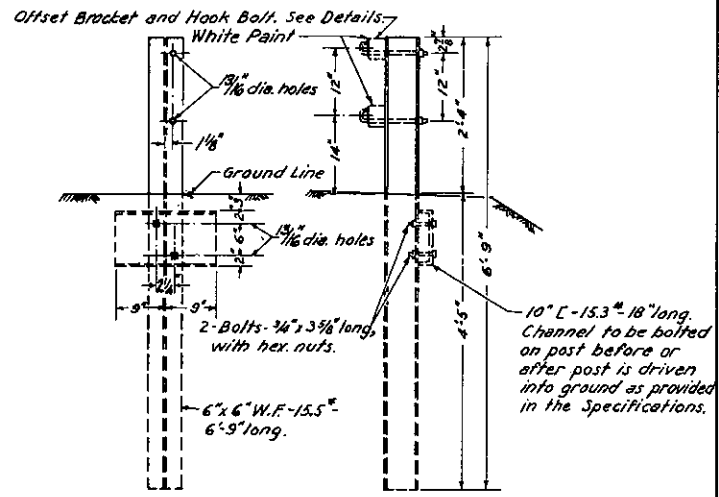
DRIVEN 2ND & 3RD POSTS FOR TYPES 1-A & 1-B



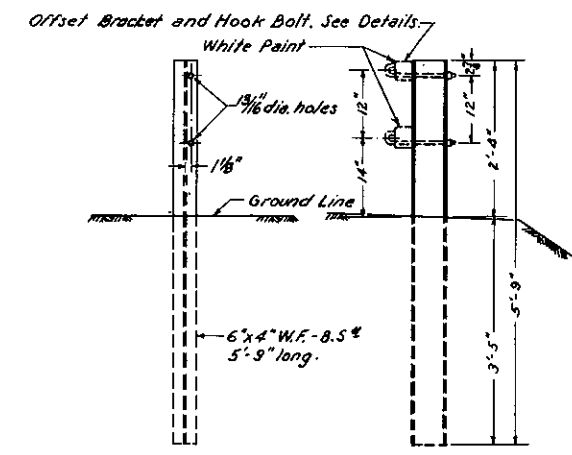
DRIVEN OR SET INTERMEDIATE POSTS FOR TYPES 1-A & 1-B



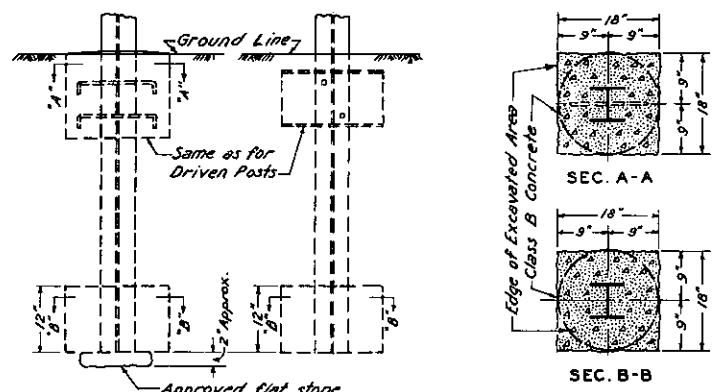
DRIVEN END POST FOR TYPE 1-C



DRIVEN 2ND & 3RD POSTS FOR TYPE 1-C

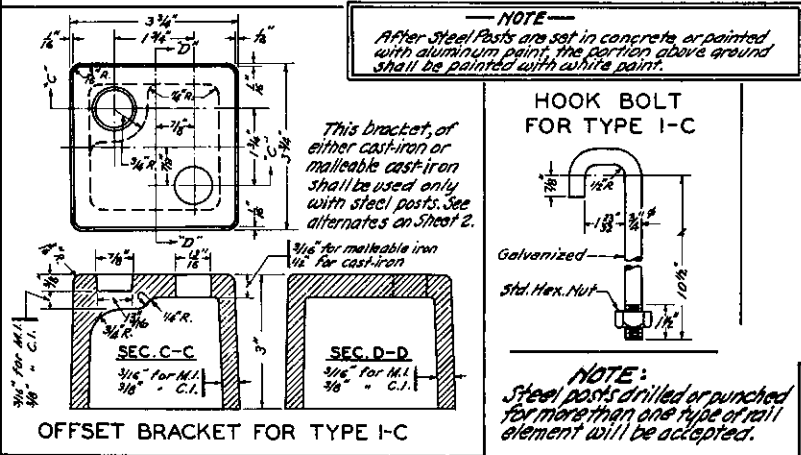


DRIVEN OR SET INTERMEDIATE POSTS FOR TYPE 1-C

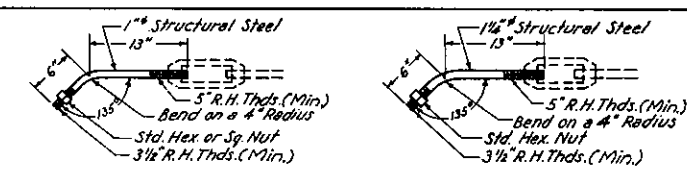


SET END POST SET 2ND AND 3RD POSTS (AT BOTH ENDS OF EACH SECTION OF GUARD FENCE.)

SET POSTS IN EXCAVATED HOLES FOR TYPES 1-A, 1-B & 1-C  
NOTE:- Details of posts shown elsewhere on this drawing.



OFFSET BRACKET FOR TYPE 1-C



BENT SECTIONS OF END TURNBUCKLE ANCHOR RODS FOR STEEL END POSTS

Note:- Bent Sections to be used in End Turnbuckle Anchor Rod Assemblies in lieu of bent sections shown in details on Standard Drawings GF-1 and GF-C.

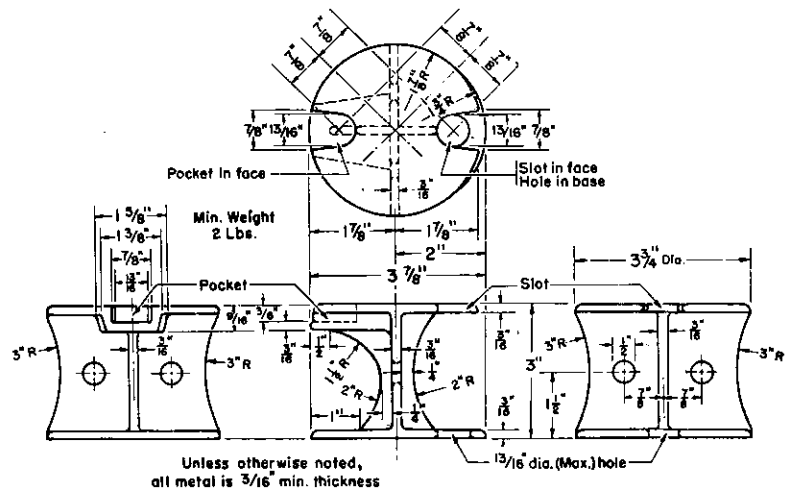
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
STEEL POSTS  
FOR  
TYPES 1-A, 1-B & 1-C GUARD FENCE

APPROVED November 1, 1961

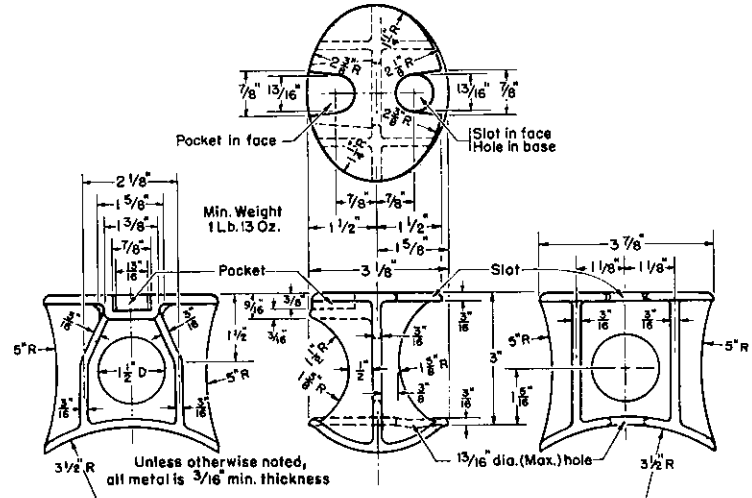
CHIEF ENGINEER

SHEET 1 OF 2

GF-SP

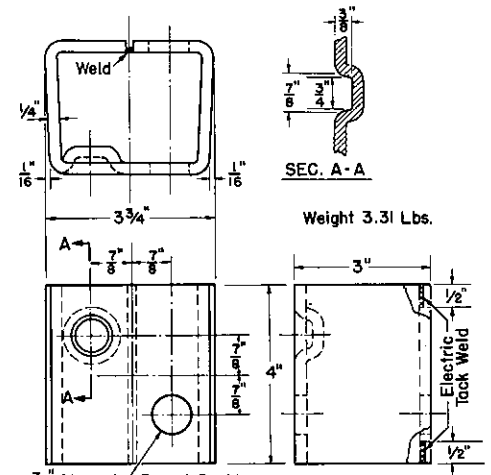


FOR STEEL POSTS

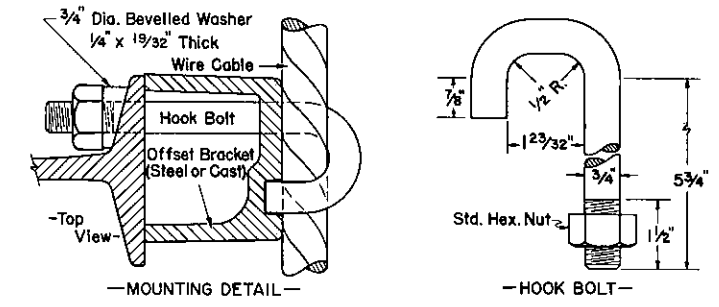
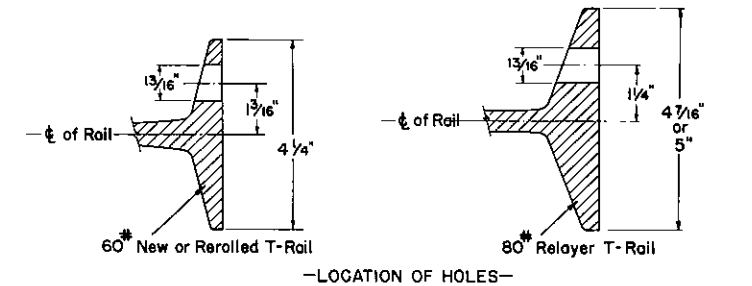


FOR WOOD AND CONCRETE POSTS

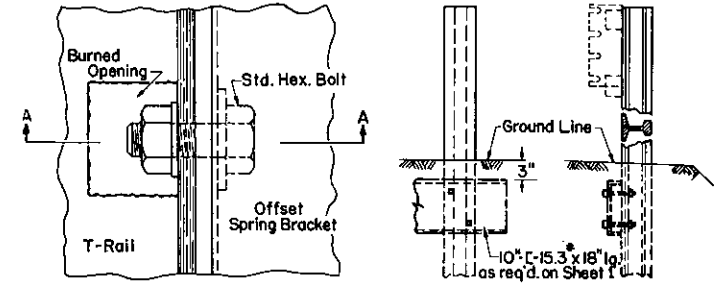
ALTERNATE MALLEABLE IRON OFFSET BRACKETS FOR TYPE I-C GUARD FENCE



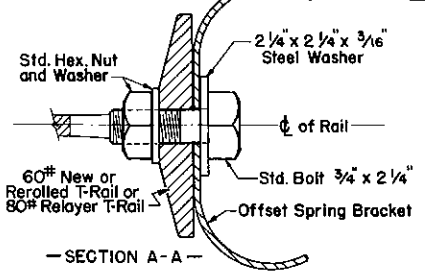
PRESSED STEEL OFFSET BRACKET (FOR STEEL POSTS OF TYPE I-C GUARD FENCE)



FOR TYPE I-C GUARD FENCE



LOCATION OF CHANNEL RESTRAINT



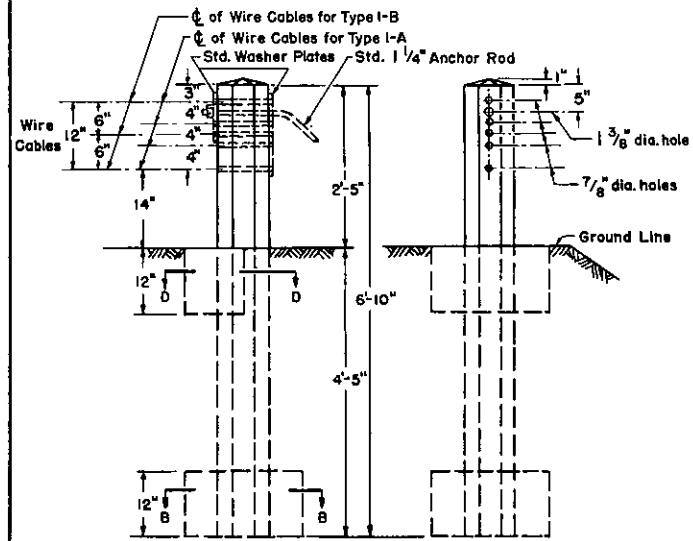
FOR TYPES I-A AND I-B GUARD FENCE RAILROAD T-RAIL POSTS

-NOTES-  
Bolts for restraints shall be 3/4" dia. x 4 1/2" long, equipped with 1/4" x 19/32" bevelled washer.  
Hole for 3/4" bolt may be burned or drilled. If burned, flange face shall be smoothed to provide good bearing for offset spring bracket.  
For other details of construction see Standard corresponding to type of guard fence used.

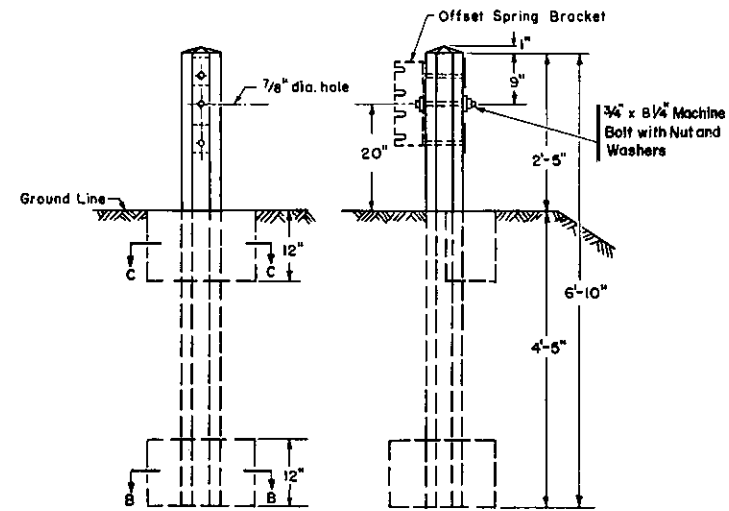
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
**STEEL POSTS**  
FOR  
TYPES I-A, I-B & I-C GUARD FENCE  
ALSO  
OFFSET BRACKETS FOR TYPE I-C

Nov. 1, 1961  
Miller

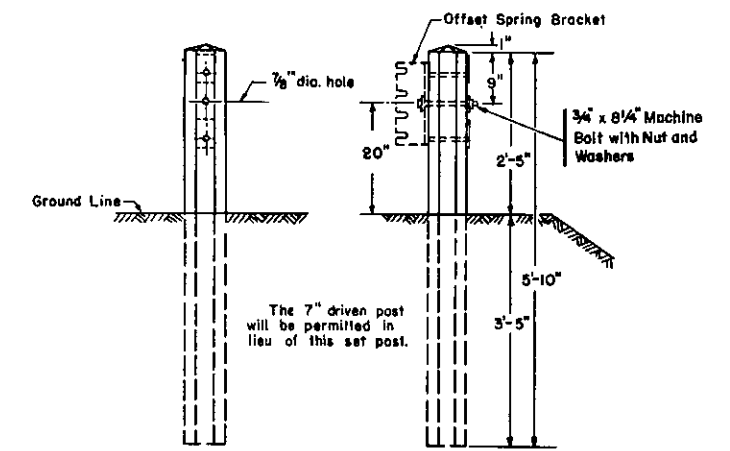
SHEET 2 OF 2  
**GF-SP**



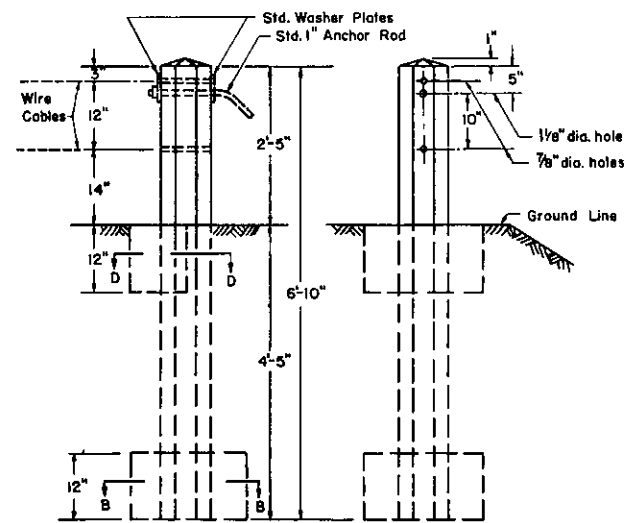
9" END POST FOR TYPES I-A AND I-B



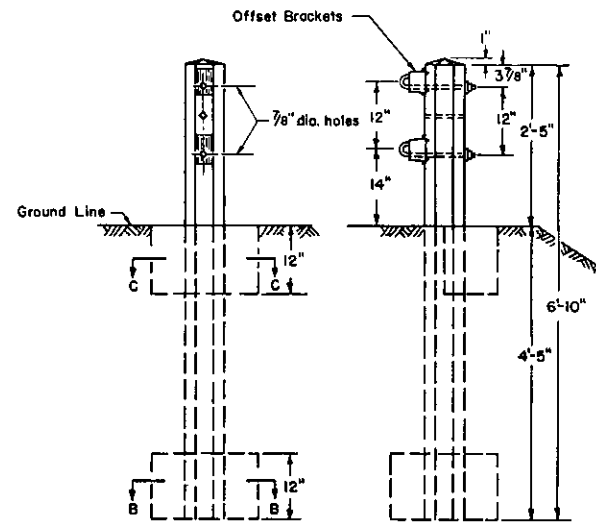
7" 2<sup>ND</sup> & 3<sup>RD</sup> POSTS FOR TYPES I-A AND I-B



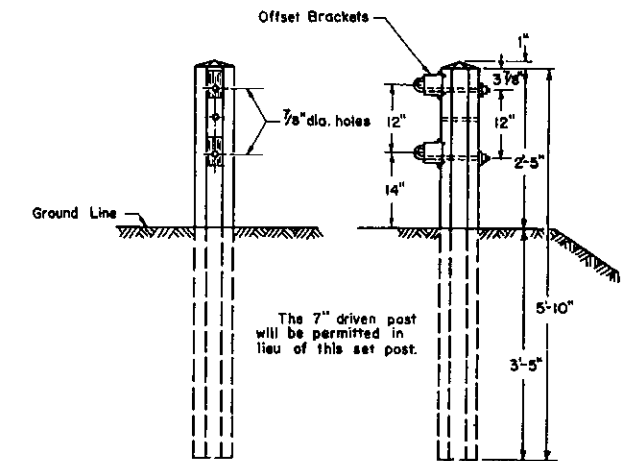
7" INTERMEDIATE POSTS FOR TYPES I-A AND I-B



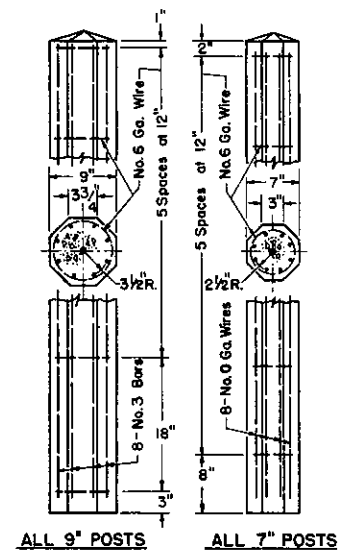
9" END POST FOR TYPE I-C



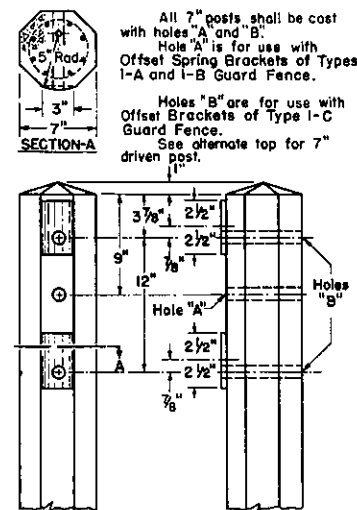
7" 2<sup>ND</sup> & 3<sup>RD</sup> POSTS FOR TYPE I-C



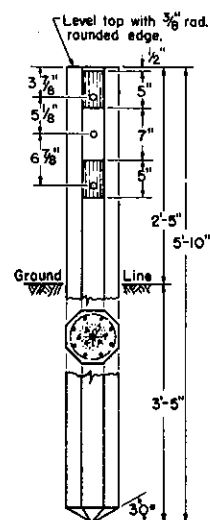
7" INTERMEDIATE POSTS FOR TYPE I-C



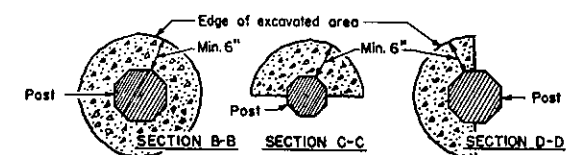
ALL 9" POSTS  
ALL 7" POSTS  
REINFORCEMENT



DETAIL OF ALL 7" POSTS



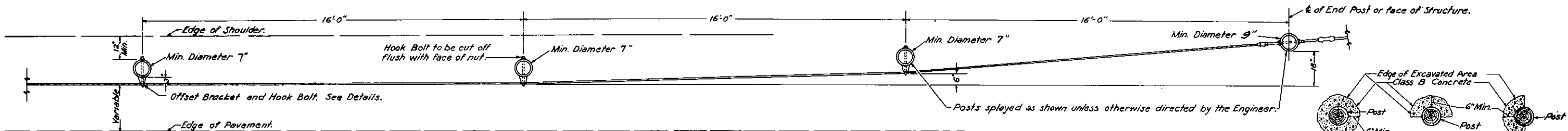
ALTERNATE  
7" DRIVEN POST



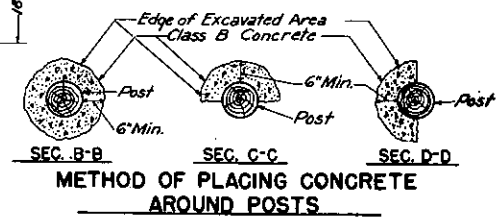
METHOD OF PLACING CLASS B CONC. AROUND POSTS

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
**PRECAST REINF. CONC. POSTS**  
FOR  
TYPES I-A, I-B & I-C GUARD FENCE  
APPROVED *November 1, 1961*  
*Jack L. ...*  
CHIEF ENGINEER  
**GF-RCP**

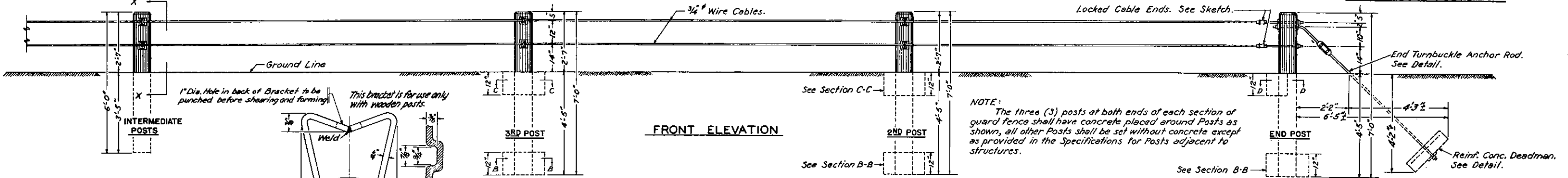




PLAN



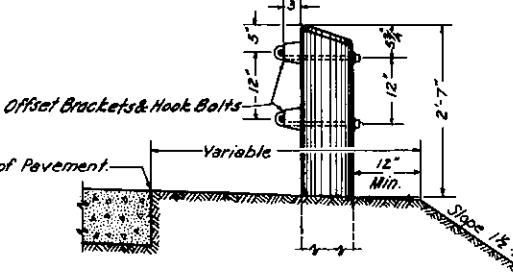
METHOD OF PLACING CONCRETE AROUND POSTS



FRONT ELEVATION

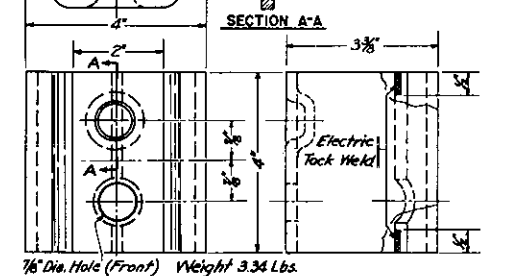
NOTE: The three (3) posts at both ends of each section of guard fence shall have concrete placed around Posts as shown, all other Posts shall be set without concrete except as provided in the Specifications for Posts adjacent to structures.

**TYPE I-C GUARD FENCE**  
(2 Cables - 50,000 Lbs.)



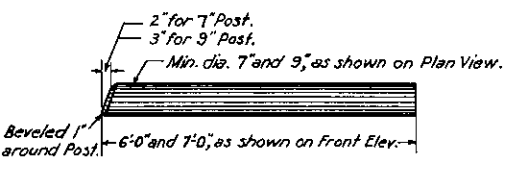
TYPICAL SECTION X-X  
(Through Intermediate Posts)

On super-elevated curves place posts to conform to the appropriate cross sections.

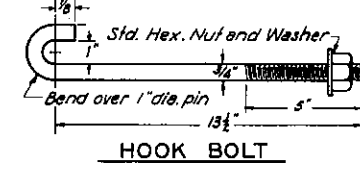


SECTION A-A  
PRESSED STEEL OFFSET BRACKET

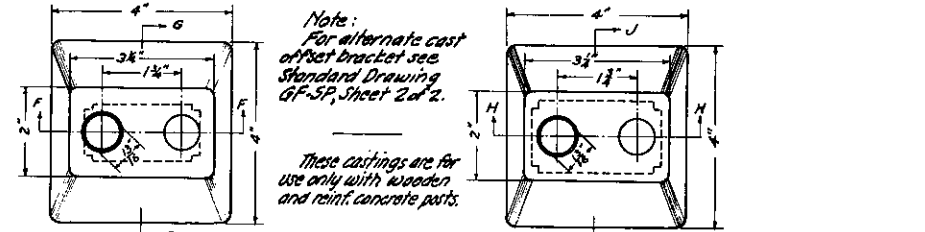
Bracket formed from 1/4"x4" bars with mill rounded edges



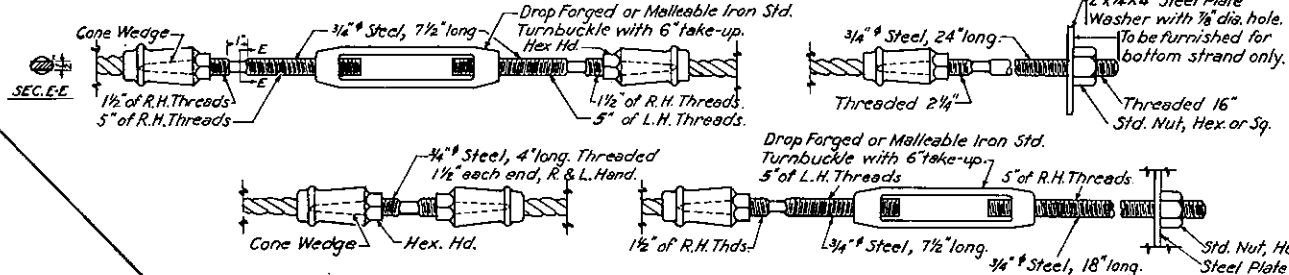
WOODEN POST



HOOK BOLT



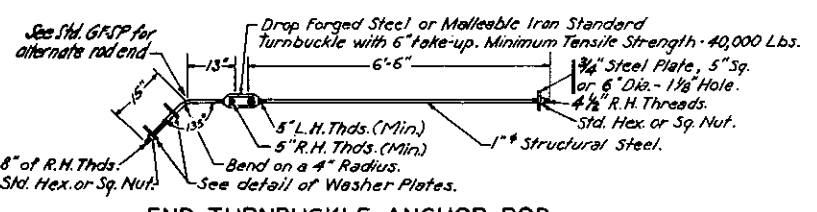
TYPE C END ANCHORAGE



CABLE SPLICES

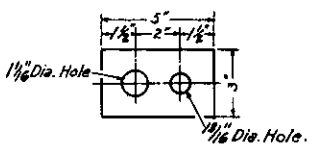
CABLE ENDS

NOTE: Cable Splices and Cable Ends shall be positive and of any type and design coinciding with the intent, design and strength of the structure, and meeting with the approval of the Engineer.

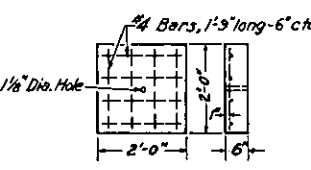


END TURNBUCKLE ANCHOR ROD

Minimum Tensile Strength of Assembly - 40,000\*

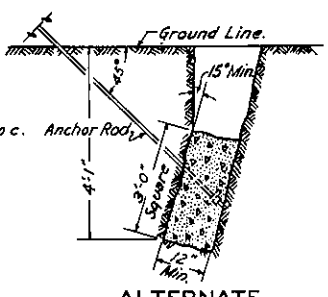


WASHER PLATE  
(3 1/4 x 5 Steel Plate.)



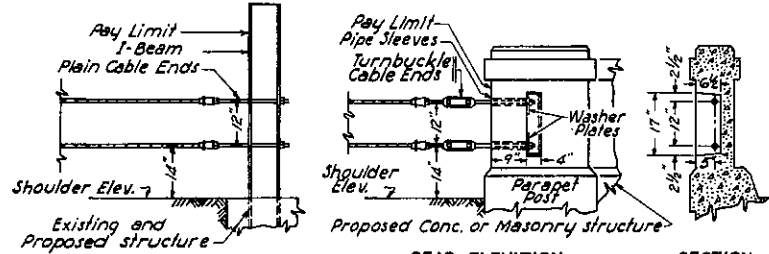
REINF. CONC. DEADMAN

10 Lbs. Reinforcement Bars  
2 Cu. Ft. of Class A Concrete.

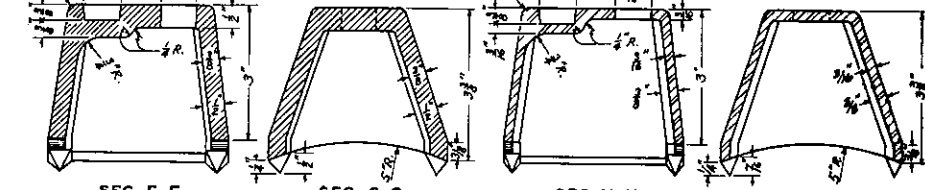


ALTERNATE CONC. DEADMAN

Min. 9.0 Cu. Ft. Class A Conc.



CONNECTIONS TO STRUCTURES



CAST IRON

MALLEABLE IRON

Approx. Wgt. - 4.25 Lbs. - Min. Wgt. 4.0 Lbs.

Approx. Wgt. - 2.5 Lbs. - Min. Wgt. - 2.35 Lbs.

CAST OFFSET BRACKETS

NOTES: All metals, except offset brackets, shall be galvanized. Cast-iron and malleable iron offset brackets shall be painted. Pressed steel offset brackets may be either painted or galvanized. Painting and galvanizing shall be in accordance with the Specifications.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
**TYPE I-C GUARD FENCE**  
(2 WIRE CABLES-FULL FLOATING)

APPROVED November 1, 1961

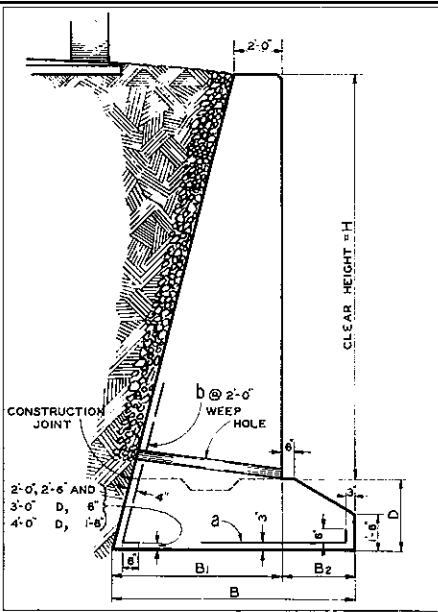
*[Signature]*  
CHIEF ENGINEER

**GF-C**

### TYPE-1

#### WALLS SUSTAINING ROADWAY AND 20 TON ROLLER

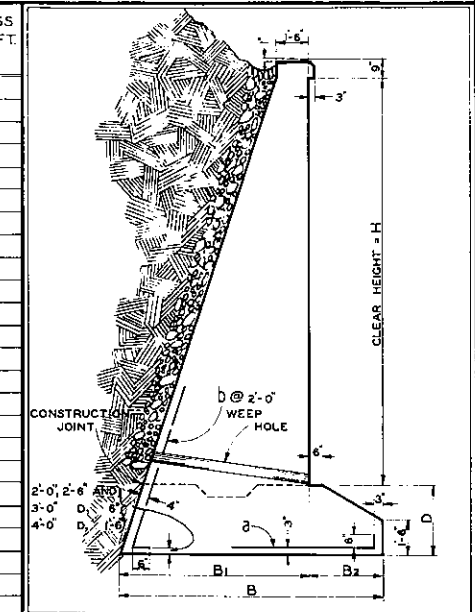
| CLEAR HEIGHT H | TOTAL BASE B | WALL BASE B <sub>1</sub> | TOE BASE B <sub>2</sub> | FOOTING DEPTH D | TOE REINFORCEMENT a        | DOWELS b     | WALL PER LIN. FT. CU. YDS. | FOOTING PER LIN. FT. CU. YDS. | STEEL PER LIN. FT. LBS. | TOE PRESS PER SQ. FT. LBS. |
|----------------|--------------|--------------------------|-------------------------|-----------------|----------------------------|--------------|----------------------------|-------------------------------|-------------------------|----------------------------|
| 2'-0"          | 3'-6"        | 2'-0"                    | 1'-6"                   | 2'-0"           |                            | 3/4" x 3'-6" | 1.48                       | 2.50                          | 2,629                   | 950                        |
| 3'-0"          | 3'-9"        | 2'-2"                    | 1'-7"                   | 2'-0"           |                            | " 4'-6"      | 2.28                       | 2.65                          | 3,380                   | 1150                       |
| 4'-0"          | 4'-2"        | 2'-6"                    | 1'-8"                   | 2'-0"           |                            | " 5'-0"      | 3.20                       | 2.92                          | 3,755                   | 1400                       |
| 5'-0"          | 4'-10"       | 3'-0"                    | 1'-10"                  | 2'-6"           |                            | " 5'-6"      | 4.32                       | 4.07                          | 4,131                   | 1700                       |
| 6'-0"          | 5'-3"        | 3'-4"                    | 1'-11"                  | 2'-6"           |                            | " 5'-6"      | 5.89                       | 4.42                          | 4,131                   | 1850                       |
| 7'-0"          | 5'-8"        | 3'-8"                    | 2'-0"                   | 2'-6"           |                            | " 5'-6"      | 6.78                       | 4.76                          | 4,131                   | 2000                       |
| 8'-0"          | 6'-2"        | 4'-0"                    | 2'-2"                   | 2'-6"           | 3/4" x 6'-0" LG., 2'-0" CC | " 5'-6"      | 8.18                       | 5.19                          | 8,636                   | 2150                       |
| 9'-0"          | 6'-7"        | 4'-4"                    | 2'-3"                   | 2'-6"           | 6'-0" x 2'-0"              | " 5'-6"      | 9.70                       | 5.54                          | 8,636                   | 2300                       |
| 10'-0"         | 7'-3"        | 4'-10"                   | 2'-5"                   | 3'-0"           | 6'-3" x 2'-0"              | " 6'-0"      | 1,152                      | 7.16                          | 9,200                   | 2600                       |
| 11'-0"         | 7'-8"        | 5'-2"                    | 2'-6"                   | 3'-0"           | 6'-3" x 2'-0"              | " 6'-0"      | 1,321                      | 7.59                          | 9,200                   | 2870                       |
| 12'-0"         | 8'-1"        | 5'-6"                    | 2'-7"                   | 3'-0"           | 6'-3" x 2'-0"              | " 6'-0"      | 1,511                      | 8.02                          | 9,200                   | 3140                       |
| 13'-0"         | 8'-6"        | 5'-10"                   | 2'-8"                   | 3'-0"           | 6'-6" x 2'-0"              | " 6'-0"      | 1,715                      | 8.45                          | 9,388                   | 3400                       |
| 14'-0"         | 9'-0"        | 6'-2"                    | 2'-10"                  | 3'-0"           | 6'-6" x 2'-0"              | " 6'-0"      | 1,926                      | 8.94                          | 9,388                   | 3670                       |
| 15'-0"         | 9'-5"        | 6'-6"                    | 2'-11"                  | 3'-0"           | 6'-9" x 1'-8"              | " 6'-0"      | 2,153                      | 9.38                          | 10,589                  | 3900                       |
| 16'-0"         | 9'-10"       | 6'-10"                   | 3'-0"                   | 3'-0"           | 6'-9" x 1'-4"              | " 6'-0"      | 2,390                      | 9.81                          | 12,110                  | 4160                       |
| 17'-0"         | 10'-3"       | 7'-2"                    | 3'-1"                   | 3'-0"           | 6'-9" x 1'-2"              | " 6'-0"      | 2,645                      | 1,025                         | 13,196                  | 4430                       |
| 18'-0"         | 10'-8"       | 7'-6"                    | 3'-2"                   | 3'-0"           | 7'-0" x 1'-0"              | " 6'-0"      | 2,905                      | 1,068                         | 15,020                  | 4590                       |
| 19'-0"         | 11'-2"       | 7'-10"                   | 3'-4"                   | 3'-0"           | 7'-0" x 11"                | " 6'-0"      | 3,178                      | 1,118                         | 15,975                  | 4760                       |
| 20'-0"         | 12'-0"       | 8'-6"                    | 3'-6"                   | 4'-0"           | 7'-3" x 1'-5"              | " 6'-0"      | 3,411                      | 1,580                         | 12,192                  | 5300                       |
| 21'-0"         | 12'-5"       | 8'-10"                   | 3'-7"                   | 4'-0"           | 7'-3" x 1'-1"              | " 6'-0"      | 3,789                      | 1,616                         | 14,558                  | 5500                       |
| 22'-0"         | 12'-10"      | 9'-2"                    | 3'-8"                   | 4'-0"           | 7'-6" x 11"                | " 6'-0"      | 4,092                      | 1,674                         | 16,795                  | 5700                       |
| 23'-0"         | 13'-4"       | 9'-6"                    | 3'-10"                  | 4'-0"           | 7'-6" x 9 1/2"             | " 6'-0"      | 4,421                      | 1,739                         | 18,735                  | 5900                       |
| 24'-0"         | 13'-9"       | 9'-10"                   | 3'-11"                  | 4'-0"           | 7'-9" x 8 1/2"             | " 6'-0"      | 4,764                      | 1,796                         | 20,940                  | 6100                       |
| 25'-0"         | 14'-2"       | 10'-2"                   | 4'-0"                   | 4'-0"           | 7'-9" x 7"                 | " 6'-0"      | 5,112                      | 1,853                         | 24,462                  | 6300                       |



### TYPE-2

#### WALLS SUSTAINING SLOPING BANKS OF EARTH OF INDEFINITE HEIGHT

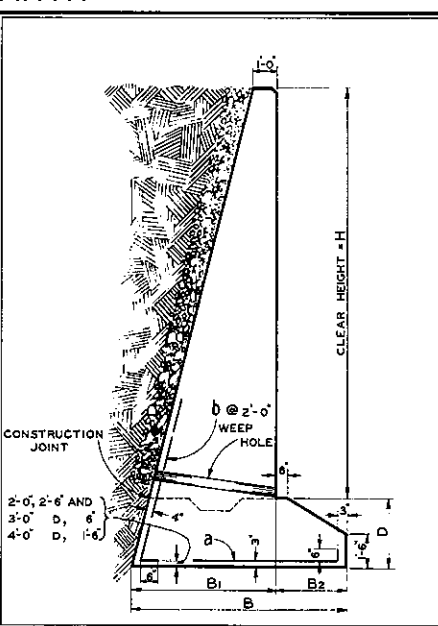
| CLEAR HEIGHT H | TOTAL BASE B | WALL BASE B <sub>1</sub> | TOE BASE B <sub>2</sub> | FOOTING DEPTH D | TOE REINFORCEMENT a        | DOWELS b     | WALL PER LIN. FT. CU. YDS. | FOOTING PER LIN. FT. CU. YDS. | STEEL PER LIN. FT. LBS. | TOE PRESS PER SQ. FT. LBS. |
|----------------|--------------|--------------------------|-------------------------|-----------------|----------------------------|--------------|----------------------------|-------------------------------|-------------------------|----------------------------|
| 2'-0"          | 2'-0"        | 1'-6"                    | 6"                      | 2'-0"           |                            | 3/4" x 3'-6" | 1.11                       | 1.48                          | 2,629                   | 1300                       |
| 3'-0"          | 2'-2"        | 1'-6"                    | 8"                      | 2'-0"           |                            | " 4'-6"      | 1.67                       | 1.60                          | 3,380                   | 1644                       |
| 4'-0"          | 2'-6"        | 1'-6"                    | 1'-0"                   | 2'-0"           |                            | " 5'-0"      | 2.22                       | 1.79                          | 3,755                   | 1975                       |
| 5'-0"          | 3'-6"        | 2'-2"                    | 1'-4"                   | 2'-6"           |                            | " 5'-6"      | 3.19                       | 2.98                          | 4,131                   | 2375                       |
| 6'-0"          | 4'-2"        | 2'-8"                    | 1'-6"                   | 2'-6"           |                            | " 5'-6"      | 4.24                       | 3.51                          | 4,131                   | 2750                       |
| 7'-0"          | 4'-9"        | 3'-1"                    | 1'-8"                   | 2'-6"           | 3/4" x 5'-0" LG., 2'-0" CC | " 5'-6"      | 5.88                       | 3.99                          | 7,886                   | 3140                       |
| 8'-0"          | 5'-4"        | 3'-7"                    | 1'-9"                   | 2'-6"           | 5'-6" x 2'-0"              | " 5'-6"      | 6.60                       | 4.48                          | 8,262                   | 3540                       |
| 9'-0"          | 5'-11"       | 4'-0"                    | 1'-11"                  | 2'-6"           | 5'-9" x 2'-0"              | " 5'-6"      | 8.26                       | 4.98                          | 8,449                   | 3930                       |
| 10'-0"         | 6'-9"        | 4'-8"                    | 2'-1"                   | 3'-0"           | 5'-9" x 2'-0"              | " 6'-0"      | 1,061                      | 6.66                          | 8,824                   | 4320                       |
| 11'-0"         | 7'-5"        | 5'-2"                    | 2'-3"                   | 3'-0"           | 6'-0" x 2'-0"              | " 6'-0"      | 1,197                      | 7.32                          | 9,012                   | 4660                       |
| 12'-0"         | 8'-0"        | 5'-8"                    | 2'-4"                   | 3'-0"           | 6'-0" x 2'-0"              | " 6'-0"      | 1,450                      | 7.92                          | 9,012                   | 5000                       |
| 13'-0"         | 8'-7"        | 6'-1"                    | 2'-6"                   | 3'-0"           | 6'-3" x 1'-8"              | " 6'-0"      | 1,619                      | 8.51                          | 10,139                  | 5340                       |
| 14'-0"         | 9'-2"        | 6'-6"                    | 2'-8"                   | 3'-0"           | 6'-6" x 1'-4"              | " 6'-0"      | 1,846                      | 9.09                          | 11,828                  | 5680                       |
| 15'-0"         | 9'-9"        | 7'-0"                    | 2'-9"                   | 3'-0"           | 6'-6" x 1'-0"              | " 6'-0"      | 2,108                      | 9.70                          | 14,269                  | 6027                       |
| 16'-0"         | 10'-4"       | 7'-5"                    | 2'-11"                  | 3'-0"           | 6'-9" x 10"                | " 6'-0"      | 2,367                      | 1,029                         | 16,672                  | 6400                       |
| 17'-0"         | 11'-0"       | 7'-11"                   | 3'-1"                   | 3'-0"           | 6'-9" x 8 1/2"             | " 6'-0"      | 2,662                      | 1,097                         | 18,820                  | 6800                       |
| 18'-0"         | 11'-6"       | 8'-4"                    | 3'-2"                   | 3'-0"           | 7'-0" x 7"                 | " 6'-0"      | 2,955                      | 1,140                         | 22,530                  | 7200                       |
| 19'-0"         | 12'-2"       | 8'-10"                   | 3'-4"                   | 3'-0"           | 7'-0" x 6"                 | " 6'-0"      | 3,284                      | 1,218                         | 25,534                  | 7600                       |
| 20'-0"         | 13'-4"       | 9'-9"                    | 3'-7"                   | 4'-0"           | 7'-3" x 8"                 | " 6'-0"      | 3,654                      | 1,731                         | 20,840                  | 8000                       |
| 21'-0"         | 13'-11"      | 10'-2"                   | 3'-9"                   | 4'-0"           | 7'-3" x 6 1/2"             | " 6'-0"      | 3,999                      | 1,808                         | 24,608                  | 8400                       |
| 22'-0"         | 14'-6"       | 10'-8"                   | 3'-10"                  | 4'-0"           | 7'-6" x 5 1/2"             | " 6'-0"      | 4,380                      | 1,889                         | 29,084                  | 8800                       |
| 23'-0"         | 15'-1"       | 11'-1"                   | 4'-0"                   | 4'-0"           | 7'-9" x 5"                 | " 6'-0"      | 4,755                      | 1,967                         | 32,443                  | 9170                       |
| 24'-0"         | 15'-8"       | 11'-7"                   | 4'-1"                   | 4'-0"           | 7'-9" x 4 1/2"             | " 6'-0"      | 5,173                      | 2,049                         | 35,547                  | 9570                       |
| 25'-0"         | 16'-3"       | 12'-0"                   | 4'-3"                   | 4'-0"           | 8'-0" x 4"                 | " 6'-0"      | 5,575                      | 2,125                         | 40,554                  | 9940                       |



### TYPE-3

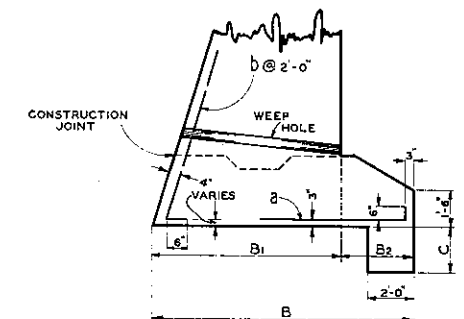
#### WALLS SUSTAINING LEVEL BANKS OF EARTH

| CLEAR HEIGHT H | TOTAL BASE B | WALL BASE B <sub>1</sub> | TOE BASE B <sub>2</sub> | FOOTING DEPTH D | TOE REINFORCEMENT a        | DOWELS b     | WALL PER LIN. FT. CU. YDS. | FOOTING PER LIN. FT. CU. YDS. | STEEL PER LIN. FT. LBS. | TOE PRESS PER SQ. FT. LBS. |
|----------------|--------------|--------------------------|-------------------------|-----------------|----------------------------|--------------|----------------------------|-------------------------------|-------------------------|----------------------------|
| 2'-0"          | 1'-10"       | 1'-3"                    | 7"                      | 2'-0"           |                            | 3/4" x 3'-6" | 0.79                       | 1.32                          | 2,629                   | 870                        |
| 3'-0"          | 2'-3"        | 1'-6"                    | 9"                      | 2'-0"           |                            | " 4'-6"      | 1.28                       | 1.59                          | 3,380                   | 1020                       |
| 4'-0"          | 2'-9"        | 1'-10"                   | 11"                     | 2'-0"           |                            | " 5'-0"      | 1.89                       | 1.90                          | 3,755                   | 1179                       |
| 5'-0"          | 3'-5"        | 2'-3"                    | 1'-2"                   | 2'-6"           |                            | " 5'-6"      | 2.62                       | 2.85                          | 4,131                   | 1433                       |
| 6'-0"          | 3'-10"       | 2'-7"                    | 1'-3"                   | 2'-6"           |                            | " 5'-6"      | 3.47                       | 3.20                          | 4,131                   | 1603                       |
| 7'-0"          | 4'-3"        | 2'-10"                   | 1'-5"                   | 2'-6"           |                            | " 5'-6"      | 4.35                       | 3.54                          | 4,131                   | 1773                       |
| 8'-0"          | 4'-9"        | 3'-2"                    | 1'-7"                   | 2'-6"           |                            | " 5'-6"      | 5.41                       | 3.96                          | 4,131                   | 1943                       |
| 9'-0"          | 5'-3"        | 3'-6"                    | 1'-9"                   | 2'-6"           |                            | " 5'-6"      | 6.58                       | 4.35                          | 4,131                   | 2113                       |
| 10'-0"         | 5'-11"       | 3'-11"                   | 2'-0"                   | 3'-0"           |                            | " 6'-0"      | 7.86                       | 5.78                          | 4,506                   | 2280                       |
| 11'-0"         | 6'-4"        | 4'-3"                    | 2'-1"                   | 3'-0"           |                            | " 6'-0"      | 9.27                       | 6.21                          | 4,506                   | 2430                       |
| 12'-0"         | 6'-9"        | 4'-6"                    | 2'-3"                   | 3'-0"           | 3/4" x 6'-0" LG., 2'-0" CC | " 6'-0"      | 1,067                      | 6.63                          | 9,012                   | 2580                       |
| 13'-0"         | 7'-3"        | 4'-10"                   | 2'-5"                   | 3'-0"           | 6'-3" x 2'-0"              | " 6'-0"      | 1,230                      | 7.12                          | 9,200                   | 2730                       |
| 14'-0"         | 7'-8"        | 5'-1"                    | 2'-7"                   | 3'-0"           | 6'-3" x 2'-0"              | " 6'-0"      | 1,410                      | 7.54                          | 9,200                   | 2880                       |
| 15'-0"         | 8'-2"        | 5'-5"                    | 2'-9"                   | 3'-0"           | 6'-6" x 2'-0"              | " 6'-0"      | 1,576                      | 8.04                          | 9,388                   | 3100                       |
| 16'-0"         | 8'-7"        | 5'-9"                    | 2'-10"                  | 3'-0"           | 6'-6" x 2'-0"              | " 6'-0"      | 1,778                      | 8.47                          | 9,388                   | 3250                       |
| 17'-0"         | 9'-0"        | 6'-0"                    | 3'-0"                   | 3'-0"           | 6'-9" x 2'-0"              | " 6'-0"      | 1,968                      | 8.89                          | 9,575                   | 3400                       |
| 18'-0"         | 9'-6"        | 6'-4"                    | 3'-2"                   | 3'-0"           | 7'-0" x 1'-8"              | " 6'-0"      | 2,192                      | 9.39                          | 10,814                  | 3550                       |
| 19'-0"         | 9'-11"       | 6'-7"                    | 3'-4"                   | 3'-0"           | 7'-0" x 1'-4"              | " 6'-0"      | 2,403                      | 9.81                          | 12,392                  | 3700                       |
| 20'-0"         | 10'-10"      | 7'-3"                    | 3'-7"                   | 4'-0"           | 7'-3" x 1'-10"             | " 6'-0"      | 2,667                      | 1,385                         | 10,446                  | 4272                       |
| 21'-0"         | 11'-3"       | 7'-6"                    | 3'-9"                   | 4'-0"           | 7'-6" x 1'-6"              | " 6'-0"      | 2,901                      | 1,439                         | 12,016                  | 4412                       |
| 22'-0"         | 11'-9"       | 7'-10"                   | 3'-11"                  | 4'-0"           | 7'-9" x 1'-2"              | " 6'-0"      | 3,167                      | 1,503                         | 14,483                  | 4552                       |
| 23'-0"         | 12'-2"       | 8'-1"                    | 4'-1"                   | 4'-0"           | 7'-9" x 1'-0"              | " 6'-0"      | 3,424                      | 1,559                         | 16,147                  | 4692                       |
| 24'-0"         | 12'-7"       | 8'-5"                    | 4'-2"                   | 4'-0"           | 8'-0" x 9 1/2"             | " 6'-0"      | 3,712                      | 1,610                         | 19,689                  | 4822                       |
| 25'-0"         | 13'-1"       | 8'-9"                    | 4'-4"                   | 4'-0"           | 8'-0" x 8 1/2"             | " 6'-0"      | 4,022                      | 1,682                         | 21,470                  | 4970                       |



#### NOTES:

- All exposed edges shall be chamfered 1 inch.
- Construction joints shall be bonded with dowels and keys.
- Expansion joints, with 4"x4" beveled keyways, shall be 25ft. to 35ft. apart and at all breaks in face of wall. Entire joint shall be surfaced with 1/4 inch of tar paper covered with hot asphaltum, or equal.
- Stone backfill 12 inches thick as shown.
- Weep holes as shown, 15 feet apart or as directed.
- Type-2 walls, having roadway at foot, shall have cap as shown and rubble gutter full length.
- With rock foundations for all types and heights, eliminate footings and consider clear height as distance from rock to top of wall.
- For sloping banks with roadway on top use Type-1 for all heights to include 12 feet. For greater heights use Type-2.
- Curtin wall shall be used when wall stands on sloping bank of earth or where scour may become excessive.
- All concrete shall be Class "B".



TYPE-1 C = .04H+1'  
 TYPE-2 C = .06H+1'  
 TYPE-3 C = .03H+1'

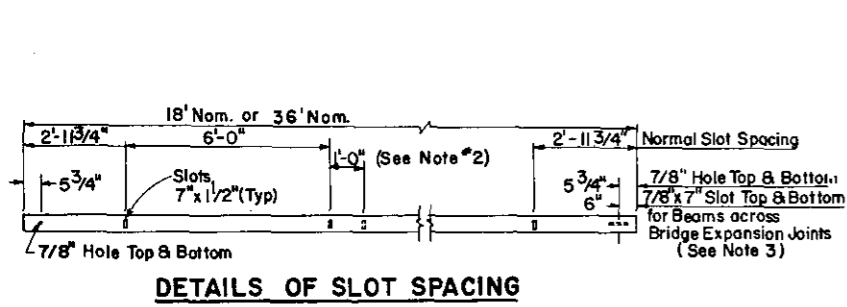
#### CURTIN WALL

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF HIGHWAYS  
 BRIDGE UNIT

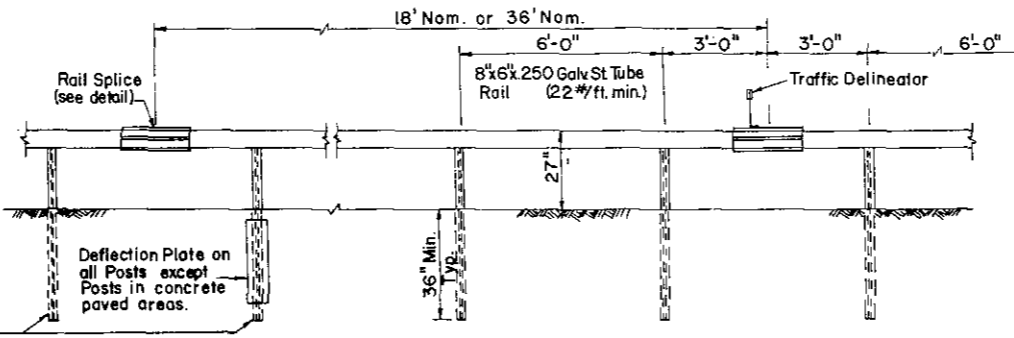
STANDARD  
 RETAINING WALLS  
 CLEAR HEIGHTS 2 TO 25 FEET  
 TYPES 1, 2 & 3

Approved July 8/32  
 E.E. Prandoo  
 BRIDGE ENGINEER

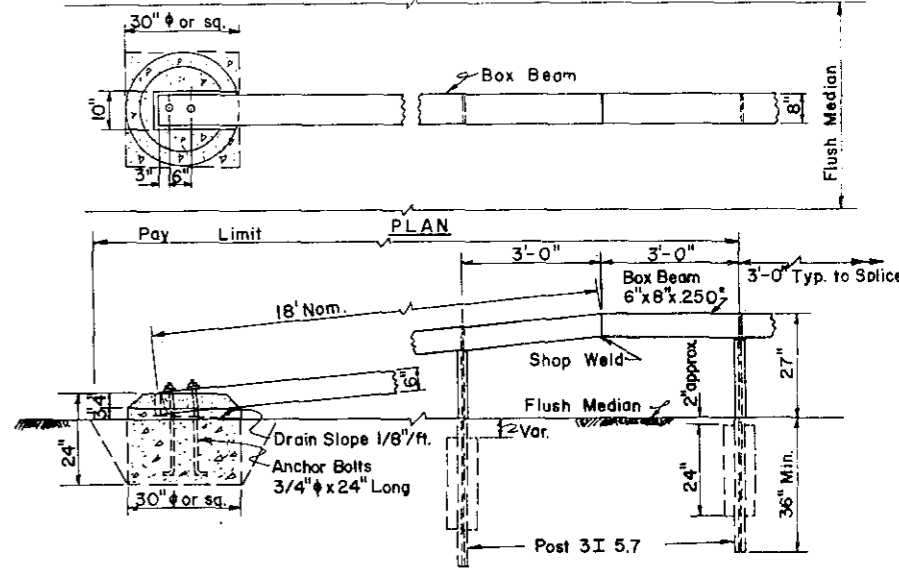
Revised 9-24-34 Type-1 24' Clear-H  
 Revised 5-7-37 Type-2 12' Clear-Wall Quan.



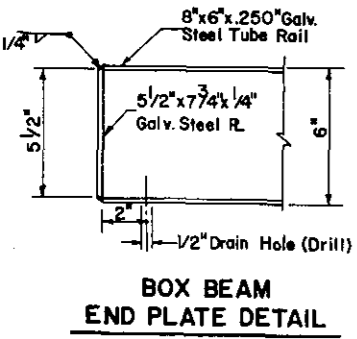
DETAILS OF SLOT SPACING



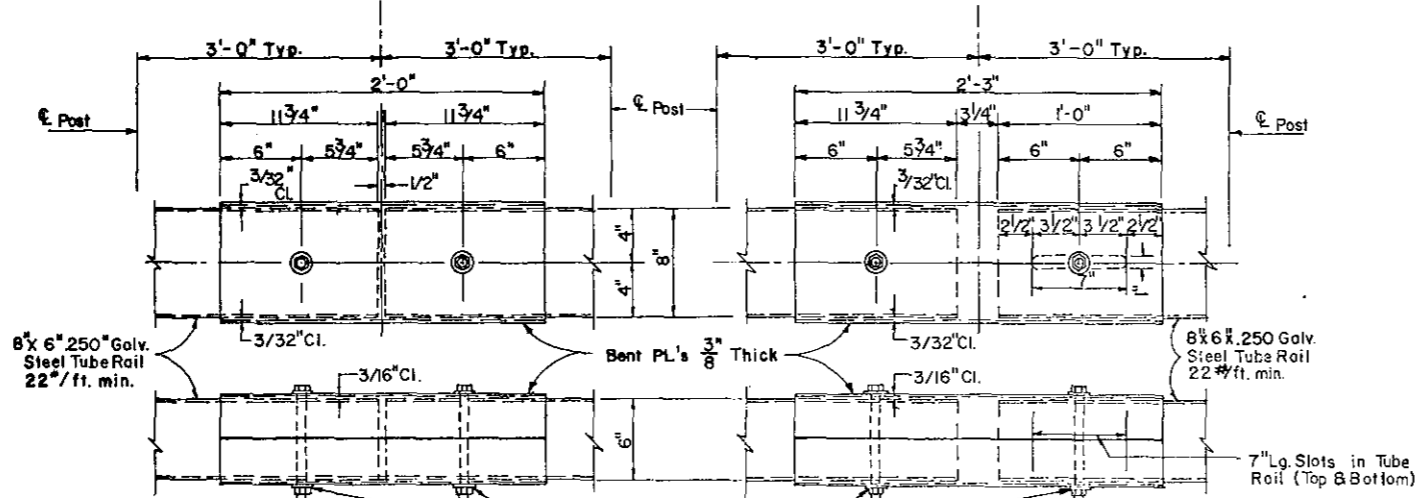
TYPICAL RAIL SPLICE & POST SPACING



ELEVATION VIEW TYPICAL END TREATMENT

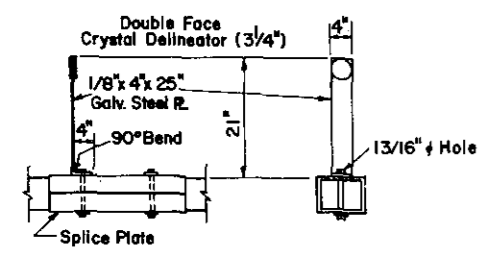


BOX BEAM END PLATE DETAIL

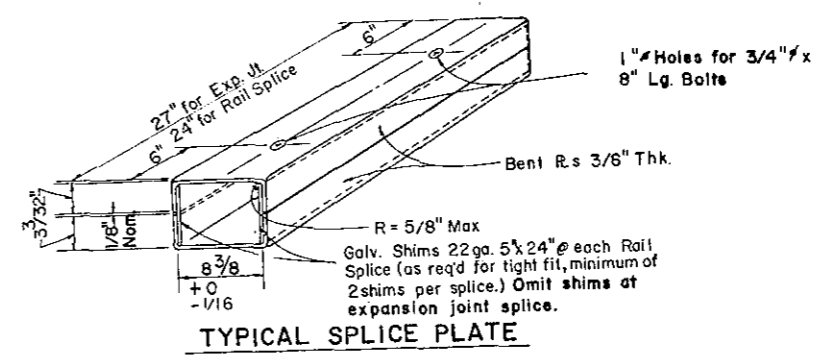


RAIL SPLICE DETAIL

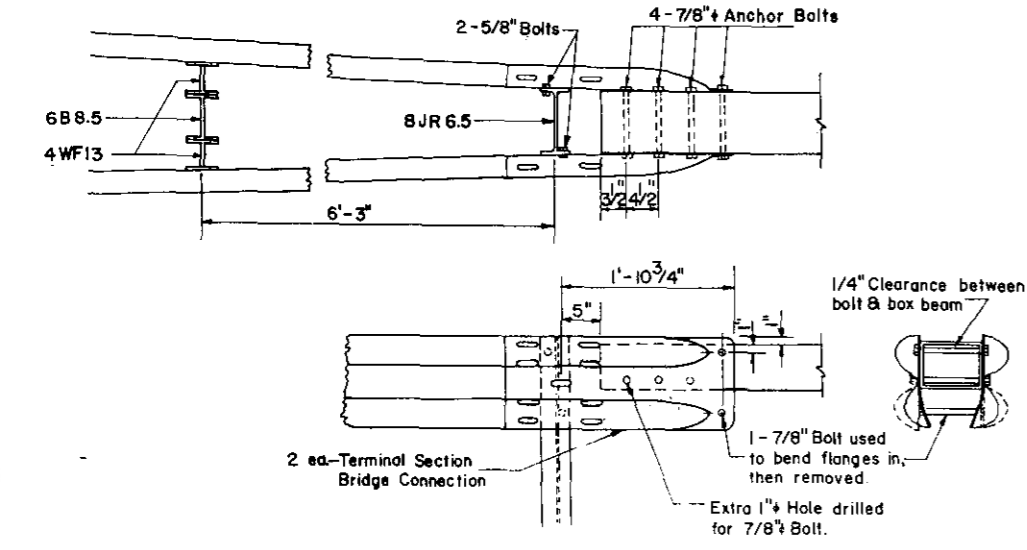
TYPICAL EXPANSION JOINT DETAIL



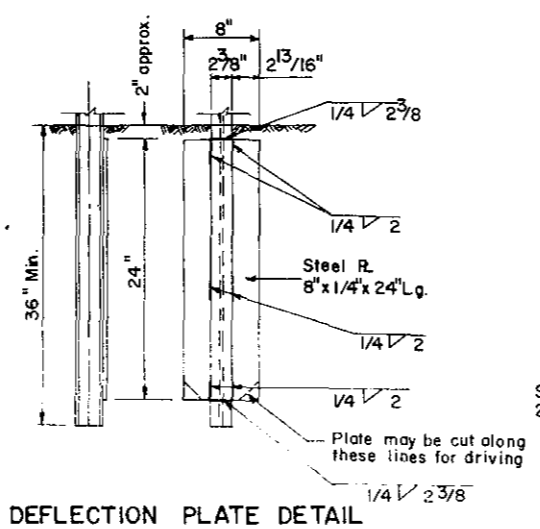
TRAFFIC DELINEATOR MOUNTING DETAIL



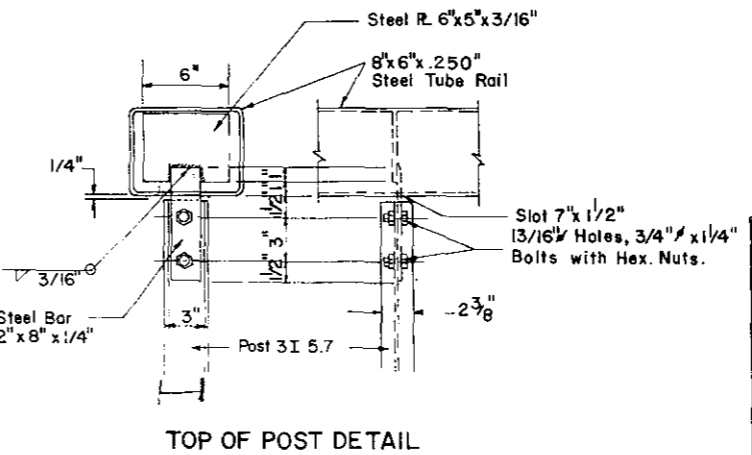
TYPICAL SPLICE PLATE



JOINING TO TYPE 2-C MEDIAN BARRIER



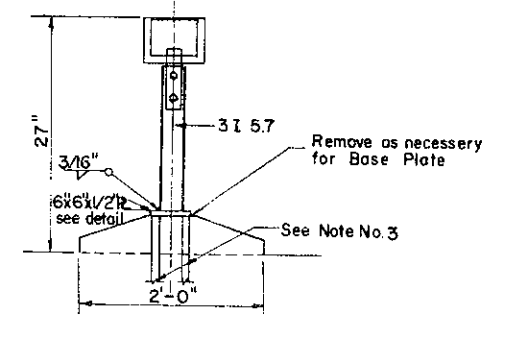
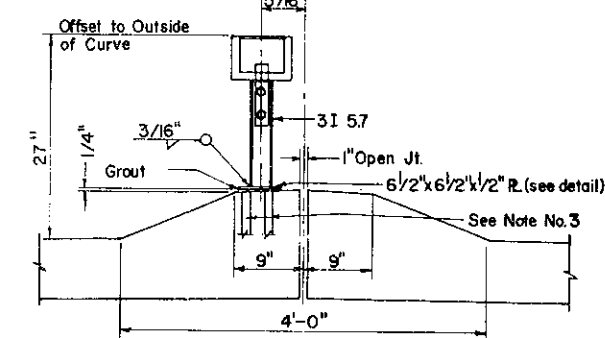
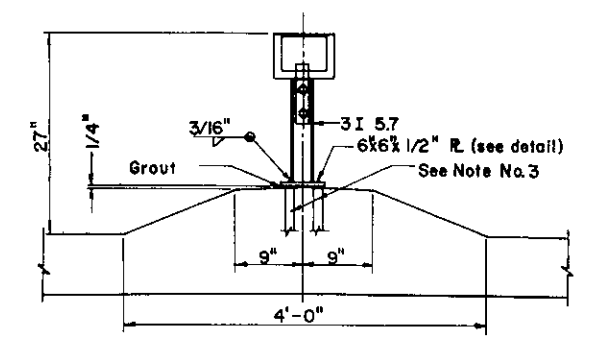
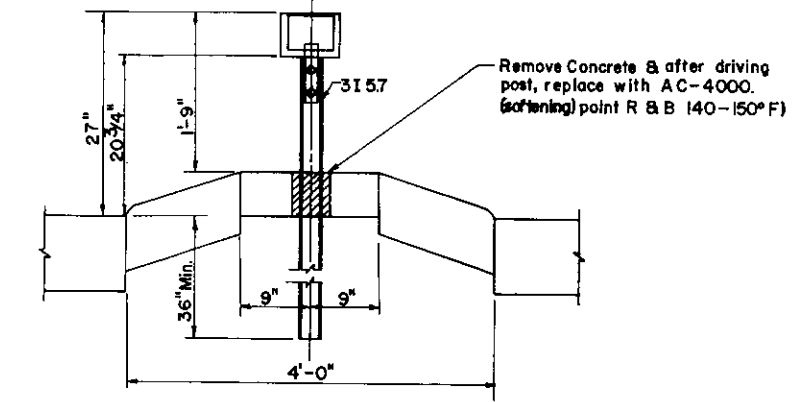
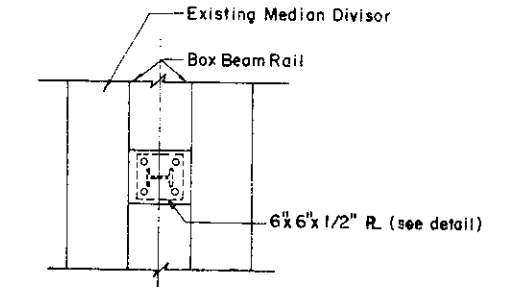
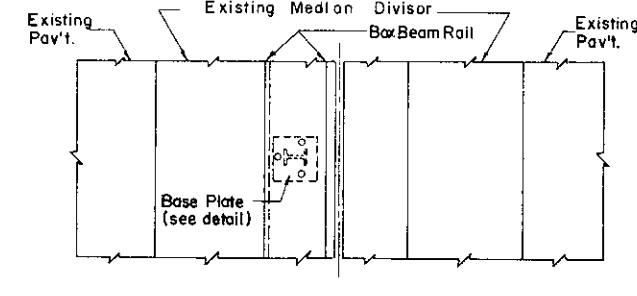
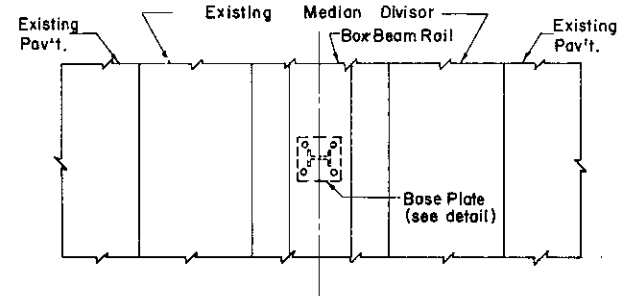
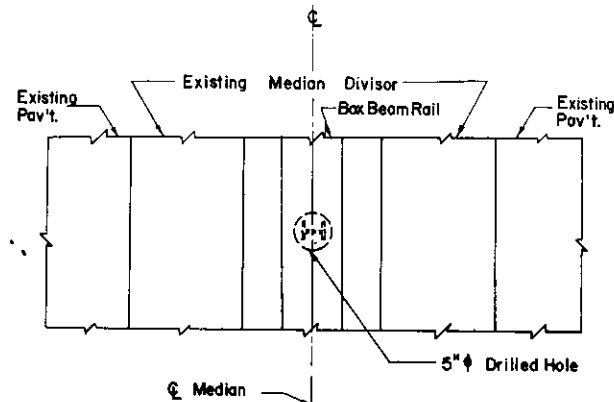
DEFLECTION PLATE DETAIL



TOP OF POST DETAIL

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
BOX BEAM MEDIAN BARRIER

APPROVED October 15, 1969 SHEET 1 OF 2  
*M. A. ...*  
CHIEF ENGINEER MB-1



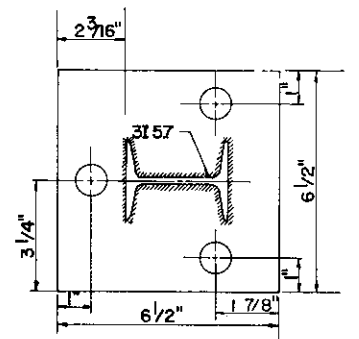
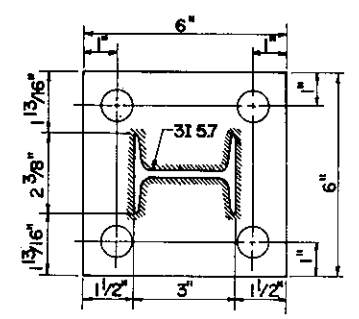
TYPICAL INSTALLATION ON EXISTING 4' ROADWAY MEDIAN DIVISOR

TYPICAL INSTALLATION ON EXISTING STRUCTURE WITHOUT  $\varnothing$  JOINT 4' MEDIAN DIVISOR

TYPICAL INSTALLATION ON EXISTING STRUCTURE WITH  $\varnothing$  JOINT 4' MEDIAN DIVISOR

TYPICAL INSTALLATION ON EXISTING STRUCTURE WITHOUT  $\varnothing$  JOINT 2' MEDIAN DIVISOR

**BOX BEAM MEDIAN BARRIER (STRUCTURE MOUNTED)**

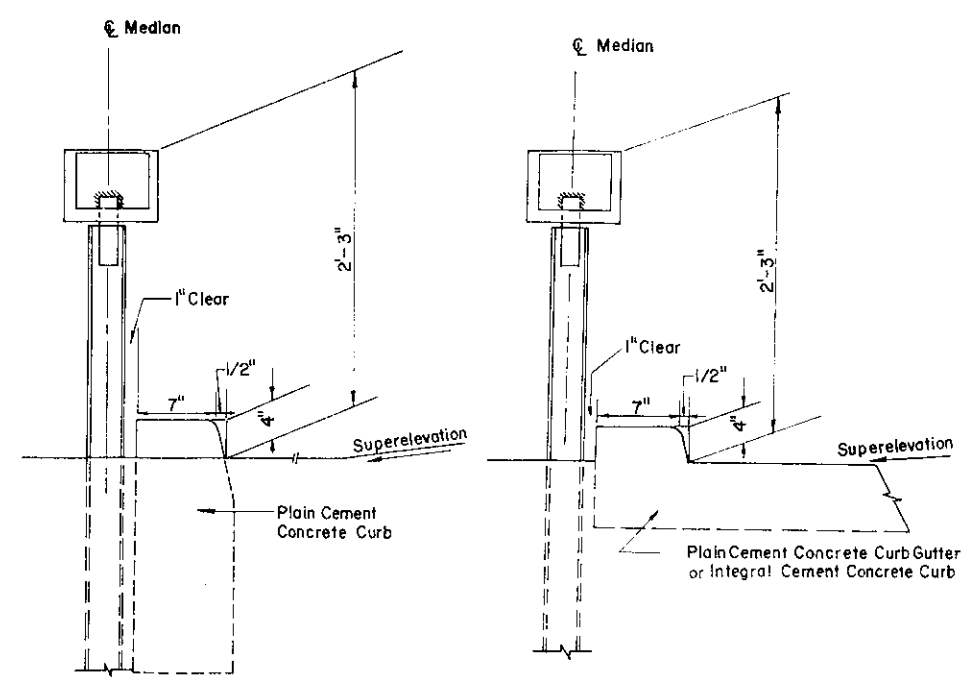


FOR MEDIAN DIVISORS WITHOUT  $\varnothing$  JOINT

FOR 4' MEDIAN DIVISOR WITH  $\varnothing$  JOINT

**BASE PLATE DETAILS**

Note: All holes 7/8" unless otherwise noted. All Welds 3/16"



**METHODS FOR CONTROLLING MEDIAN DRAINAGE**

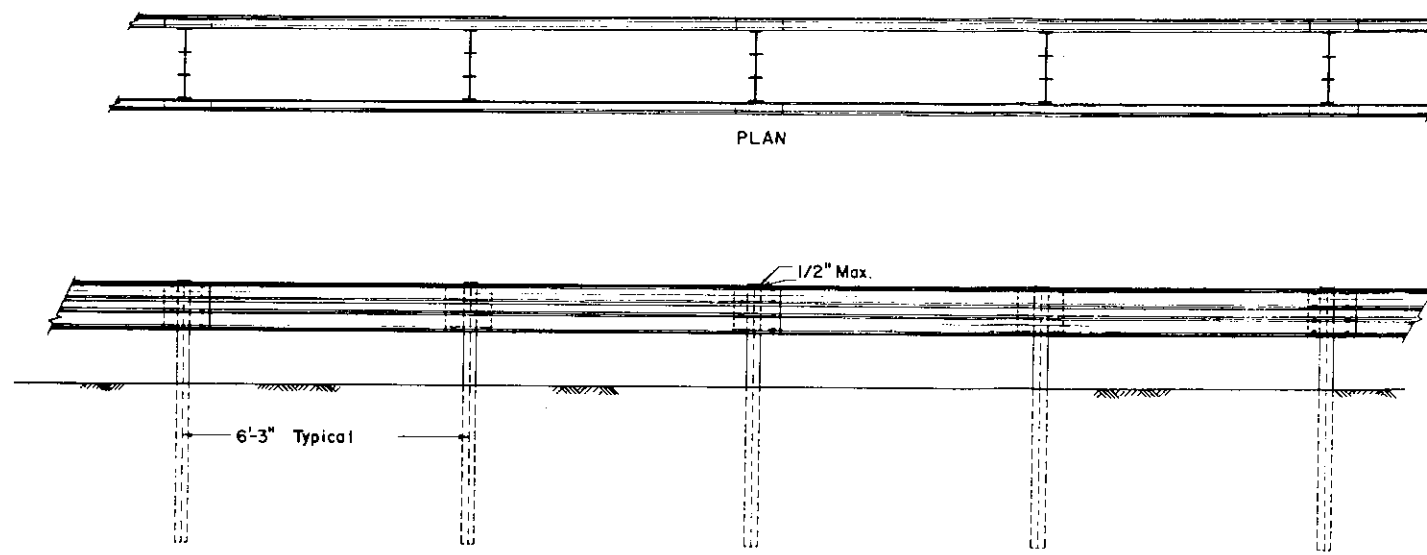
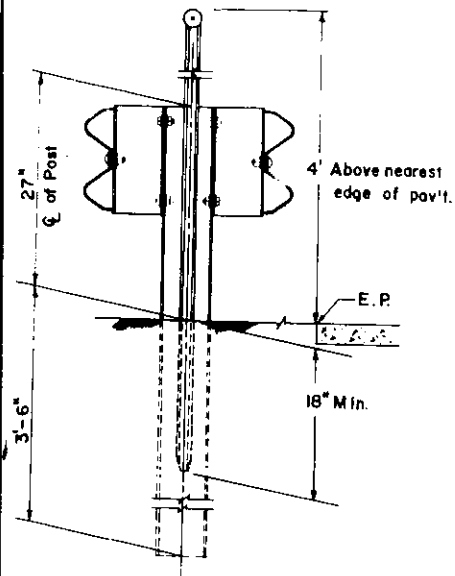
**NOTES:**

1. For curves, with a degree of curve in excess of 3°30' the rail elements shall be shop worked to the required curvature. No separate or additional compensation will be allowed for shop working of the rail elements.
2. Where typical post spacing results in post being located over cross drain, post shall be shifted 1'-0" in direction to provide maximum clearance between post and cross drain.
3. For anchorage to existing bridge decks and divisors, see construction drawings.
4. It may be necessary to use a shorter section of rail, near the expansion joint of the bridge, to provide for a splice across the joint.
5. When grout is not used, place 1 layer of 12oz. canvas duck, swabbed with red lead paste, between base plate and concrete.
6. All materials shall conform to the requirements of Form 408.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
**BOX BEAM MEDIAN BARRIER**

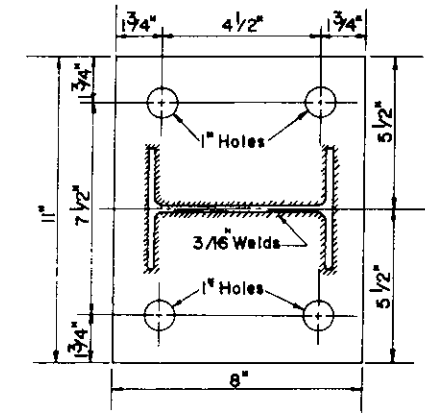
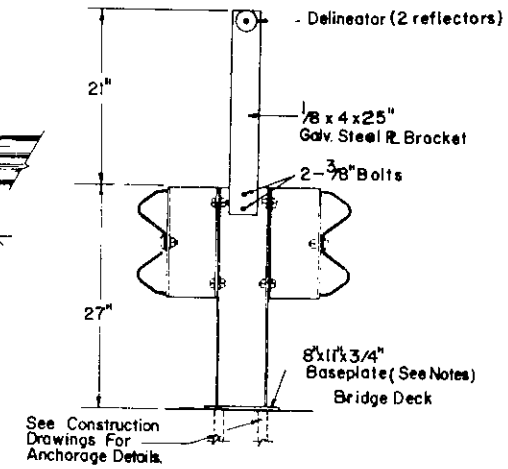
SHEET 2 OF 2  
**MB-1**

October 15, 1969



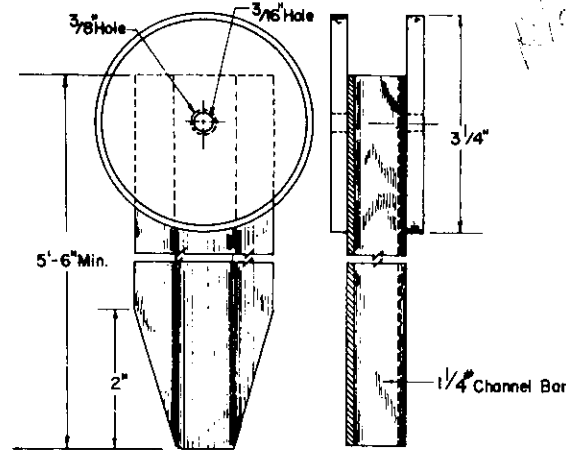
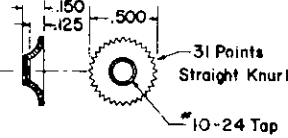
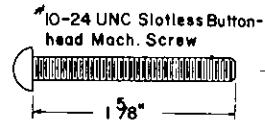
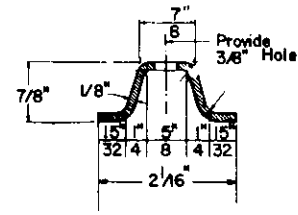
TYPE 2-C MEDIAN BARRIER

See Sheet 2 and 3  
for End Treatment



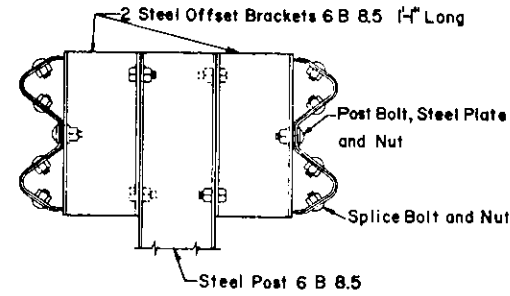
BASE PLATE DETAIL

STRUCTURE MOUNTED BARRIER  
(EXISTING STRUCTURES)

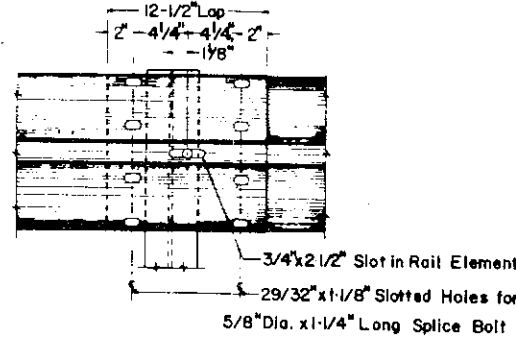


TRAFFIC DELINEATOR

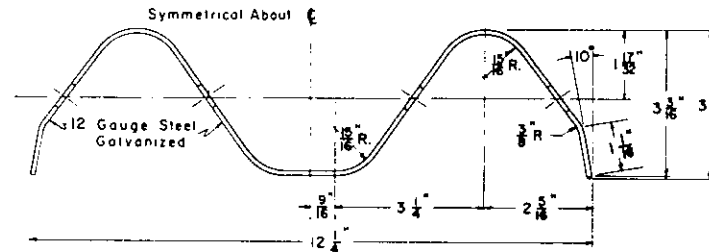
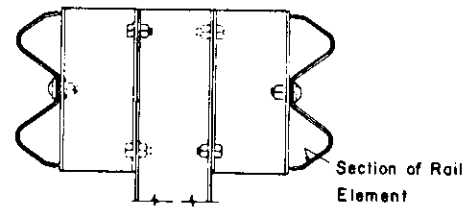
Note: Delineator spacing 200'



TYPICAL RAIL SPLICE

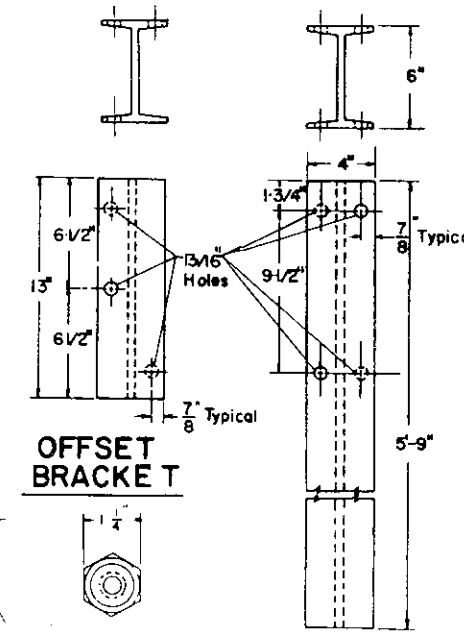


TYPICAL RAIL BACKING PLATE



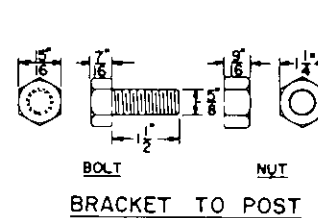
SECTION THRU RAIL ELEMENT

- NOTES
1. When grout is not used, place 1 layer of 12 oz. canvas duck, swabbed with red lead paste, between base plate and concrete.
  2. All materials shall conform to the requirements of Form 408.

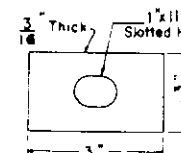


OFFSET BRACKET

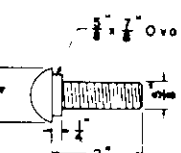
POST DETAIL



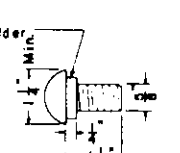
BOLT NUT  
BRACKET TO POST



STEEL PLATE



POST BOLT



SPLICE BOLT

NUT

Revised to add Sheet 4 of 4  
JULY 22, 1969

*W. W. ...*  
Chief Engineer

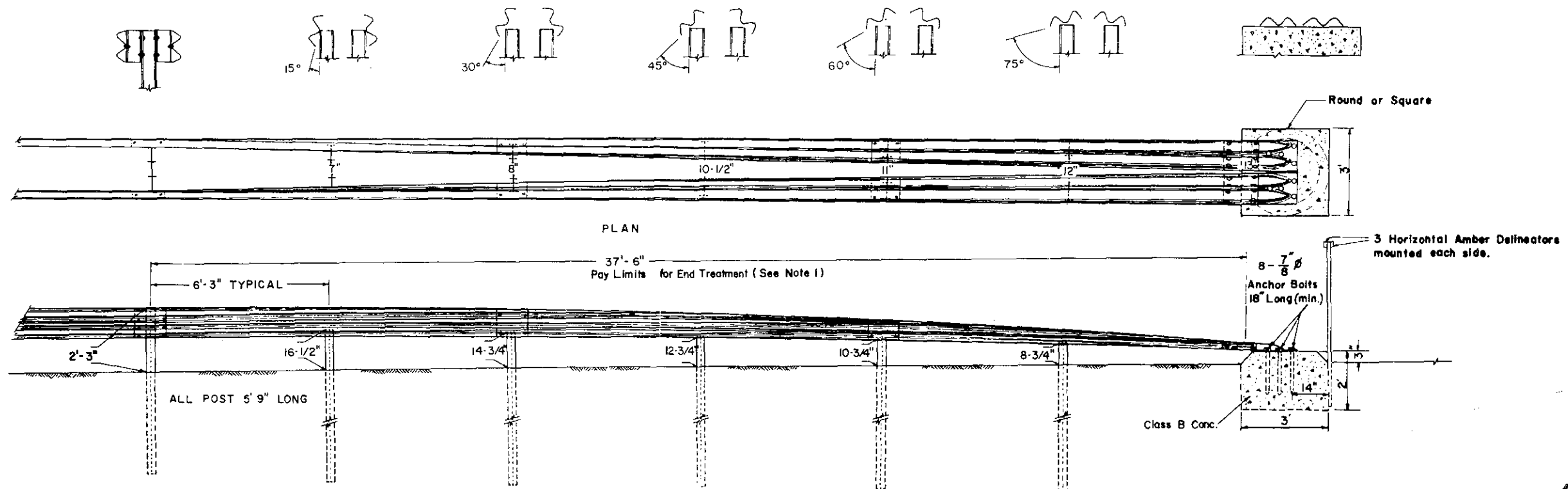
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
TYPE 2-C MEDIAN BARRIER

APPROVED February 5, 1968

*W. W. ...*  
CHIEF ENGINEER

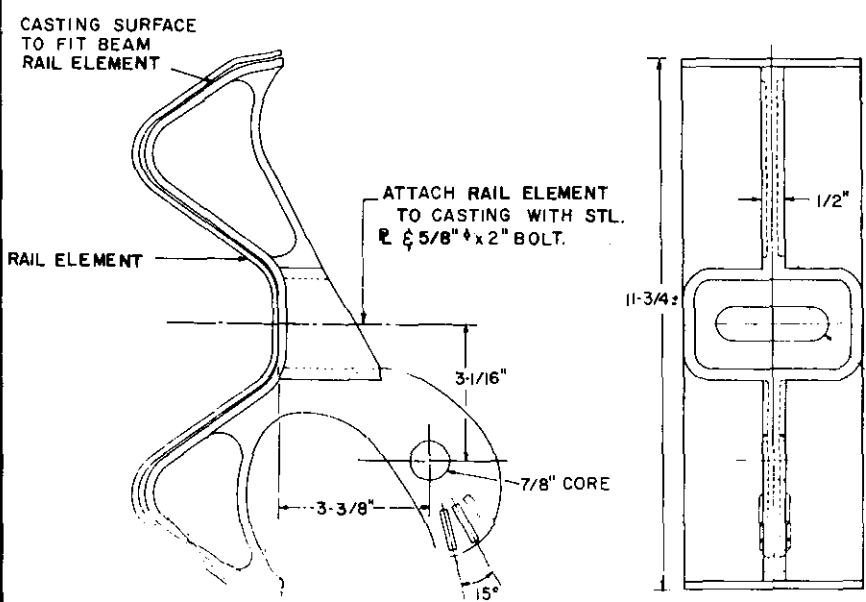
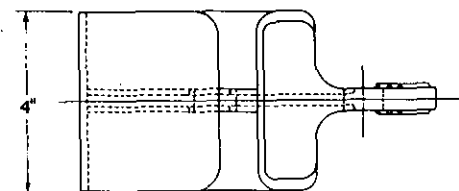
SHEET 1 OF 4

MB-2

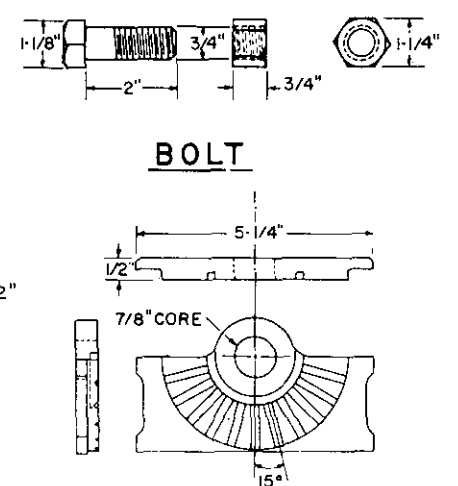


**TYPE 2-C MEDIAN BARRIER END TREATMENT**

*We may not need this.*

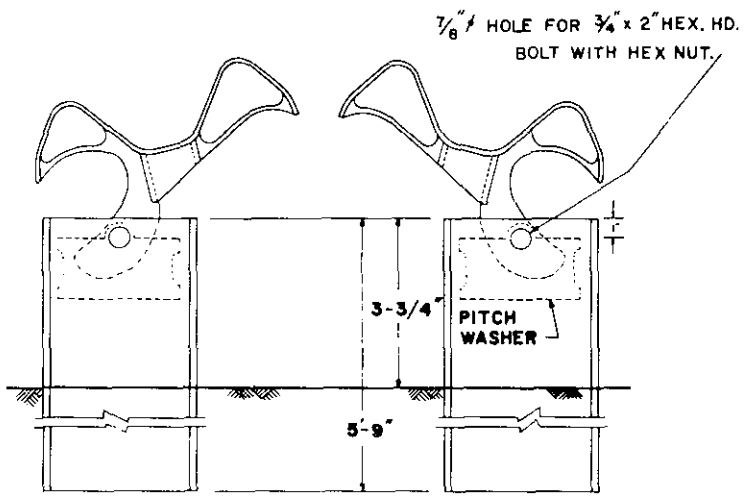


**ANCHORAGE CASTING\***



**BOLT**

**PITCH WASHER\***



**ANCHORAGE CASTING  
(AT 75° POSITION)**

- NOTES**
1. Payment for End Treatment shall include the last 37 1/2 linear feet of sloping rails, terminal sections, hardware and Class B Concrete
  2. Other types of rotating brackets may be used as approved by the Engineer

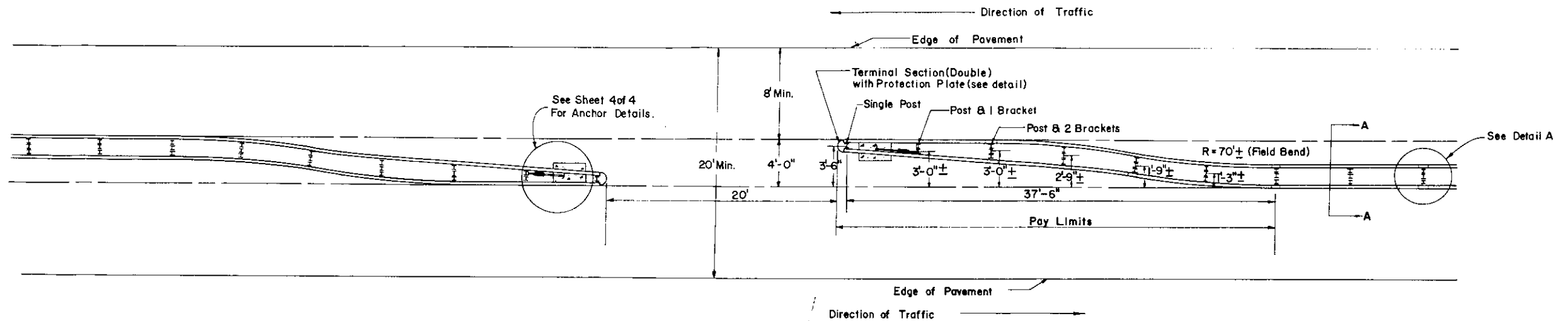
JULY 22, 1969

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

**TYPE 2-C MEDIAN BARRIER**

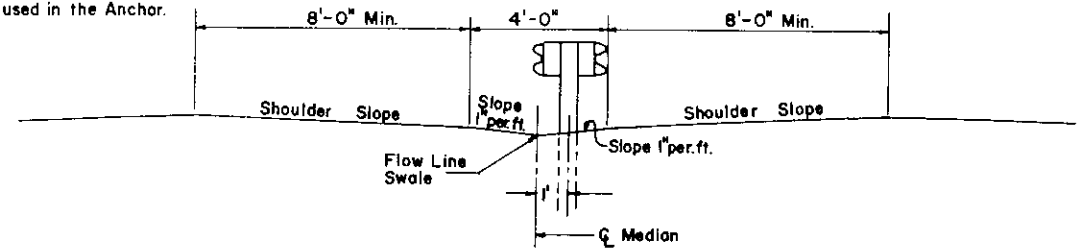
SHEET 2 of 4  
**MB-2**

\* Malleable cast iron ASTM A-47 Grade 35018 and galvanized in accordance with AASHTO designation M111

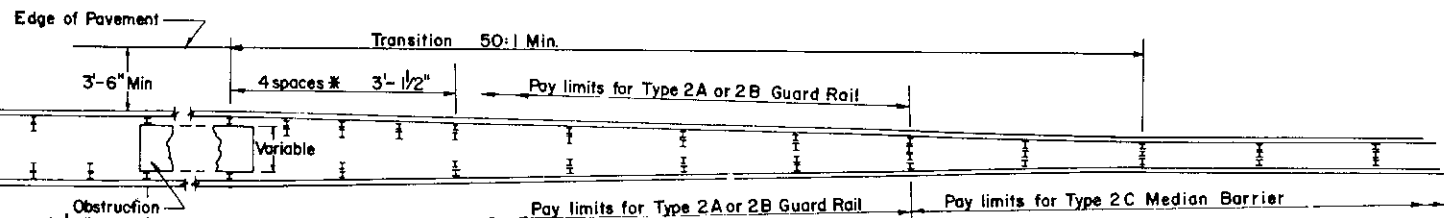
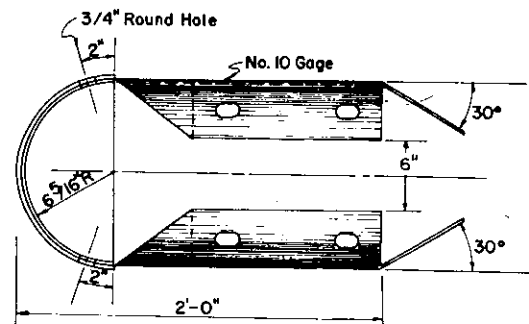


**TYPE 2-C MEDIAN BARRIER END TREATMENT (MEDIAN CROSS-OVER)**

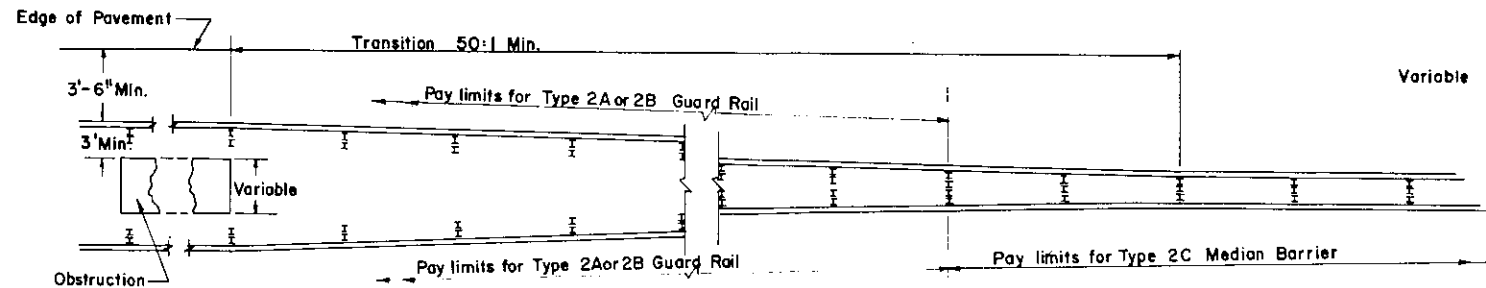
Payment for Type 2-C Median Barrier End Treatment (Median Cross-Over), shall include the last 37 1/2 linear feet of median barrier on both sides of the opening, Terminal Sections, Class B Concrete, and related hardware used in the Anchor.



**SECTION A-A**



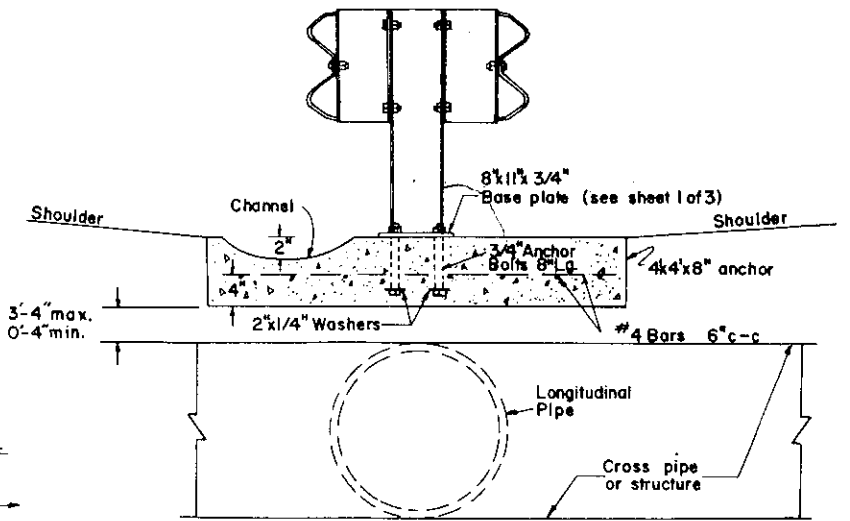
**RESTRICTED CONDITION**



**NORMAL CONDITION**

**PROTECTIVE TREATMENT FOR MEDIAN OBSTRUCTIONS**

\* No separate or additional payments will be made for additional posts or block outs for 3'-1/2" post spacing.



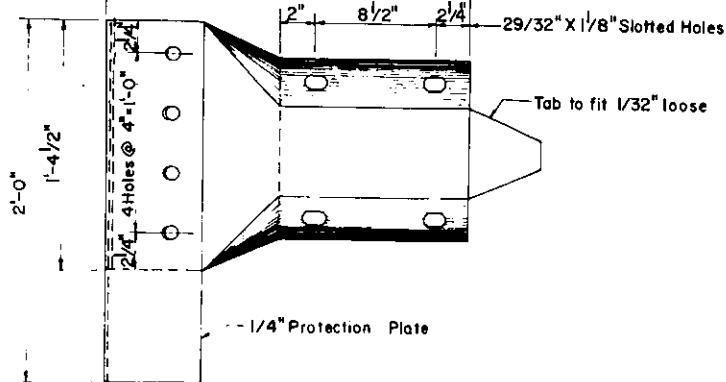
**DETAIL A**

ALTERNATE CONSTRUCTION WHEN CROSSING UNDERGROUND STRUCTURE (NO SEPARATE PAYMENT WILL BE MADE FOR THIS TYPE CONSTRUCTION)

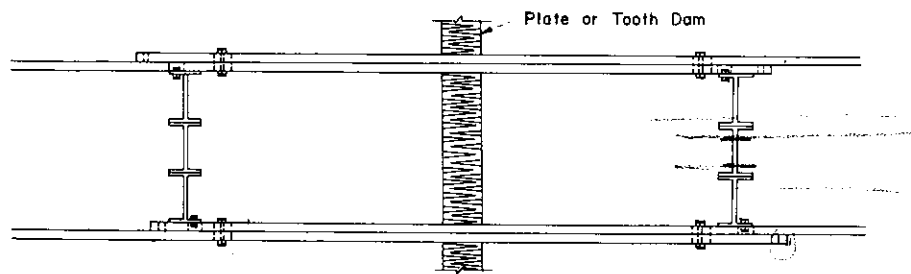
JULY 22, 1969

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
TYPE 2-C MEDIAN BARRIER**

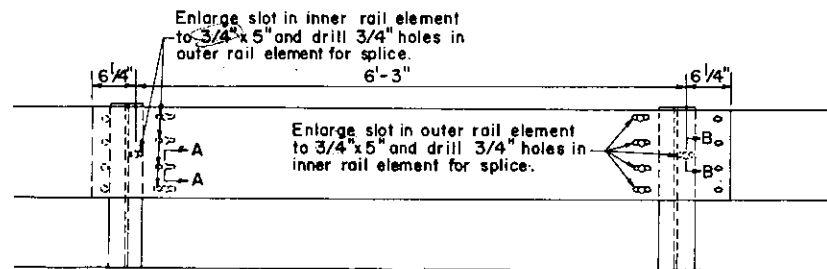
**TERMINAL SECTION (DOUBLE)**



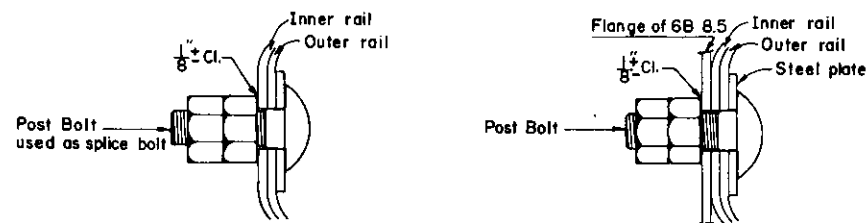
*Anchor bolts  
AP-27-325*



PLAN VIEW



ELEVATION VIEW

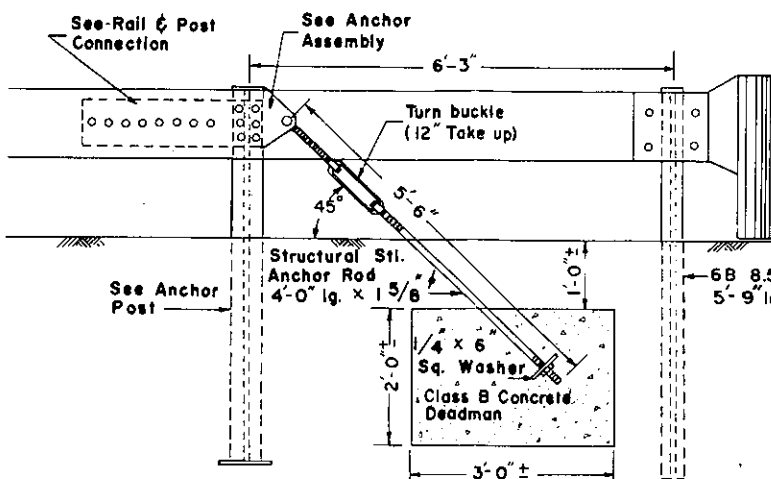
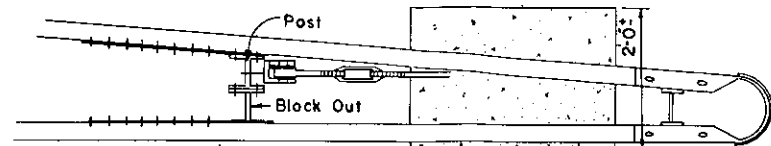


SECTION A-A

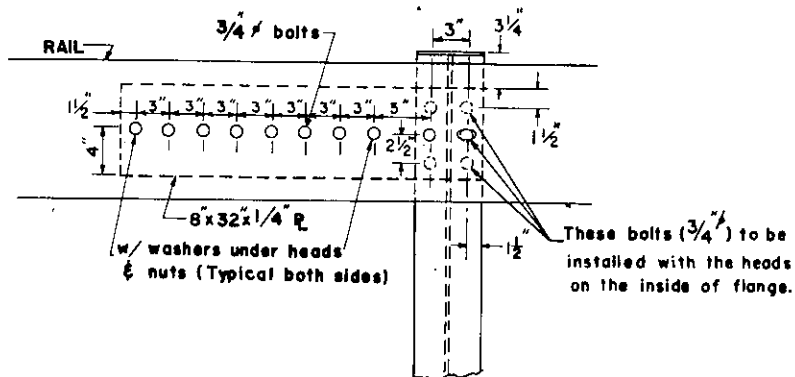
SECTION B-B

**RAIL EXPANSION JT. DETAIL**

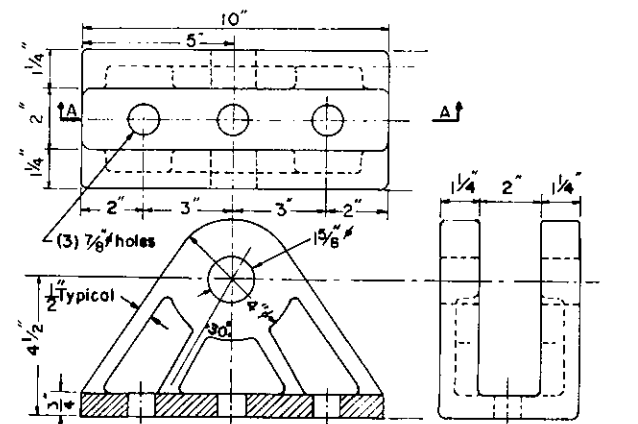
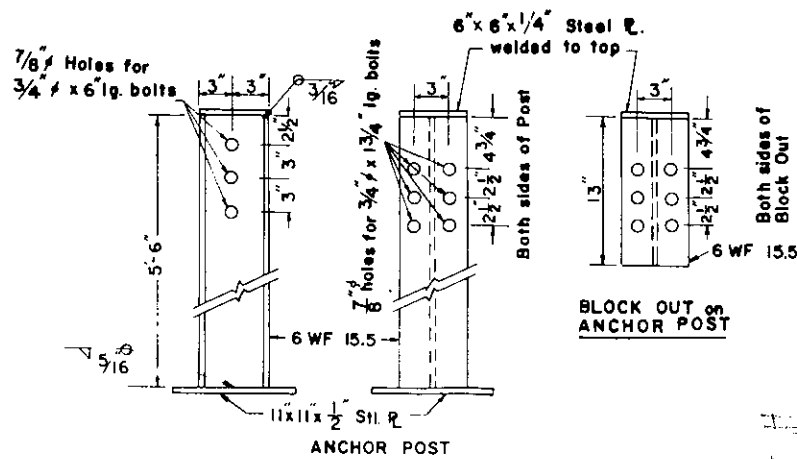
No separate or additional payments will be made for installing Rail Expansion Joints.



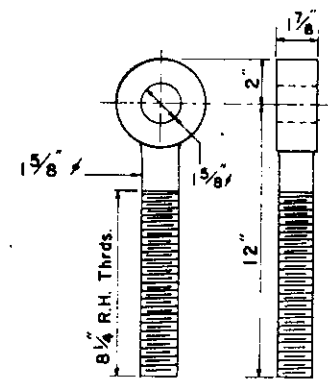
**ANCHOR DETAIL**



**RAIL & POST CONNECTION**

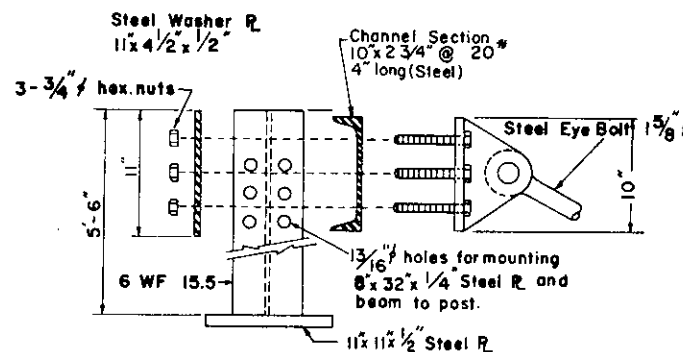


SECTION A-A  
MALLEABLE IRON CASTING  
ASTM. SPEC. A47 GRADE #35018  
**ANCHOR CONNECTOR**  
ALL RADII 1/8" UNLESS NOTED.  
GALV. A-183

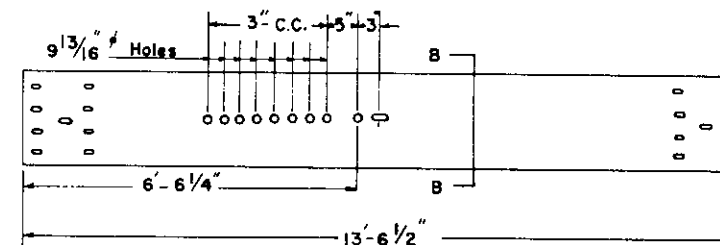


**STEEL EYE BOLT**

To be attached to Anchor Connector by means of a 1 1/2" x 6" lg. heat treated machine bolt and 1 1/2 hex nut & std. round washer.



**ANCHOR ASSEMBLY**



**RAIL SECTION FOR ANCHOR**

SECTION B-B

JULY 22, 1969

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

TYPE 2-C MEDIAN BARRIER

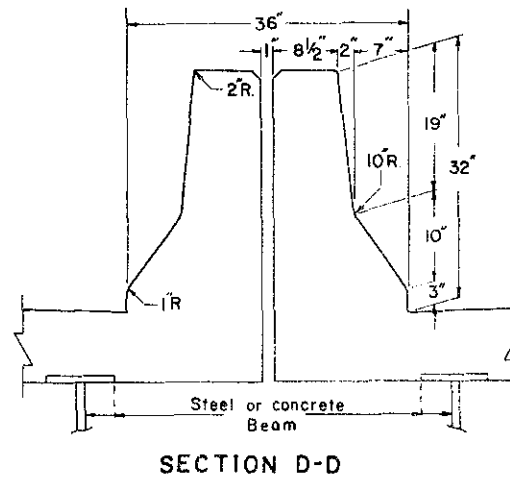
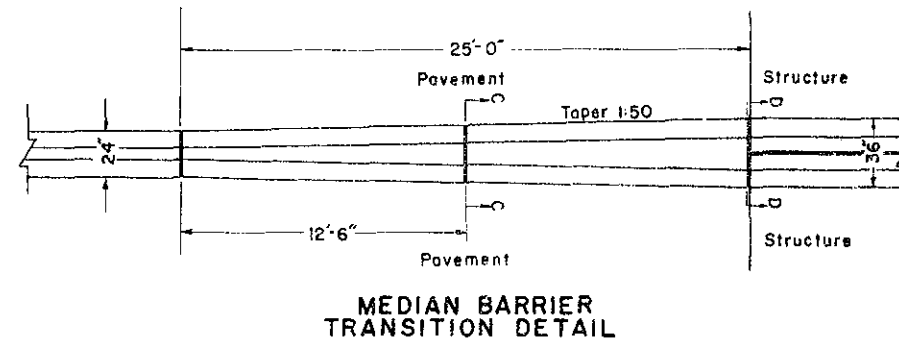
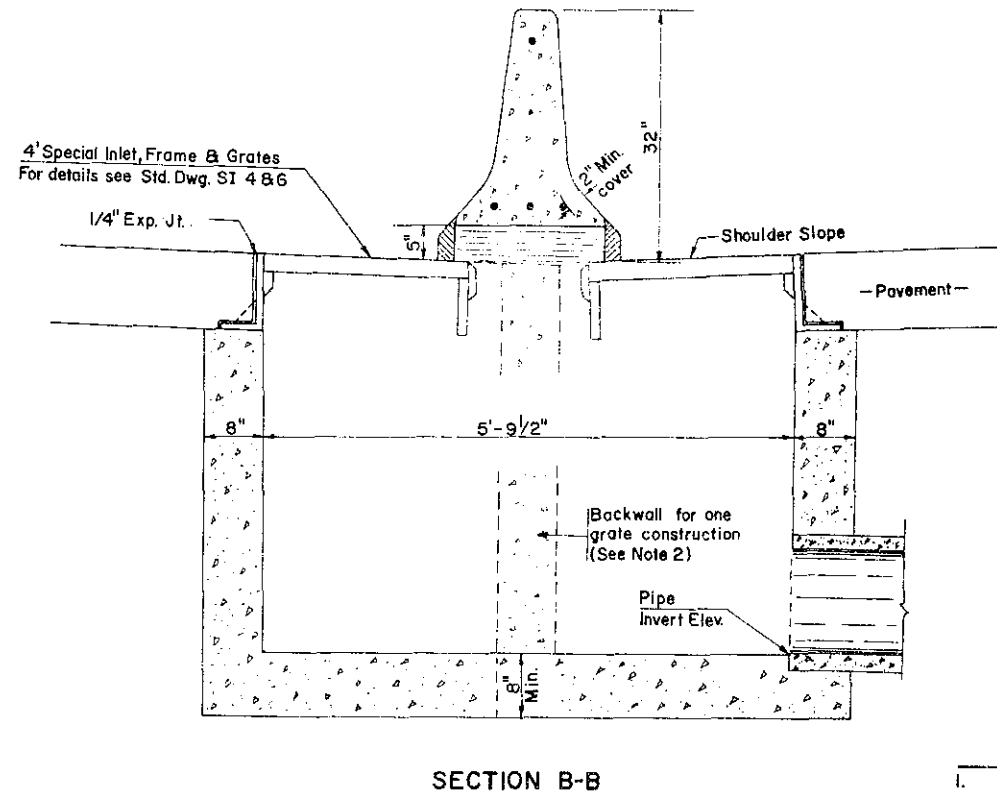
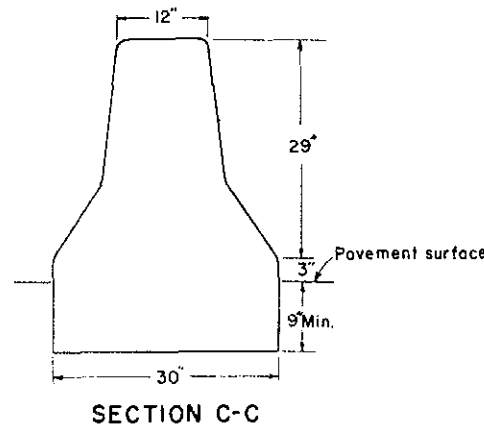
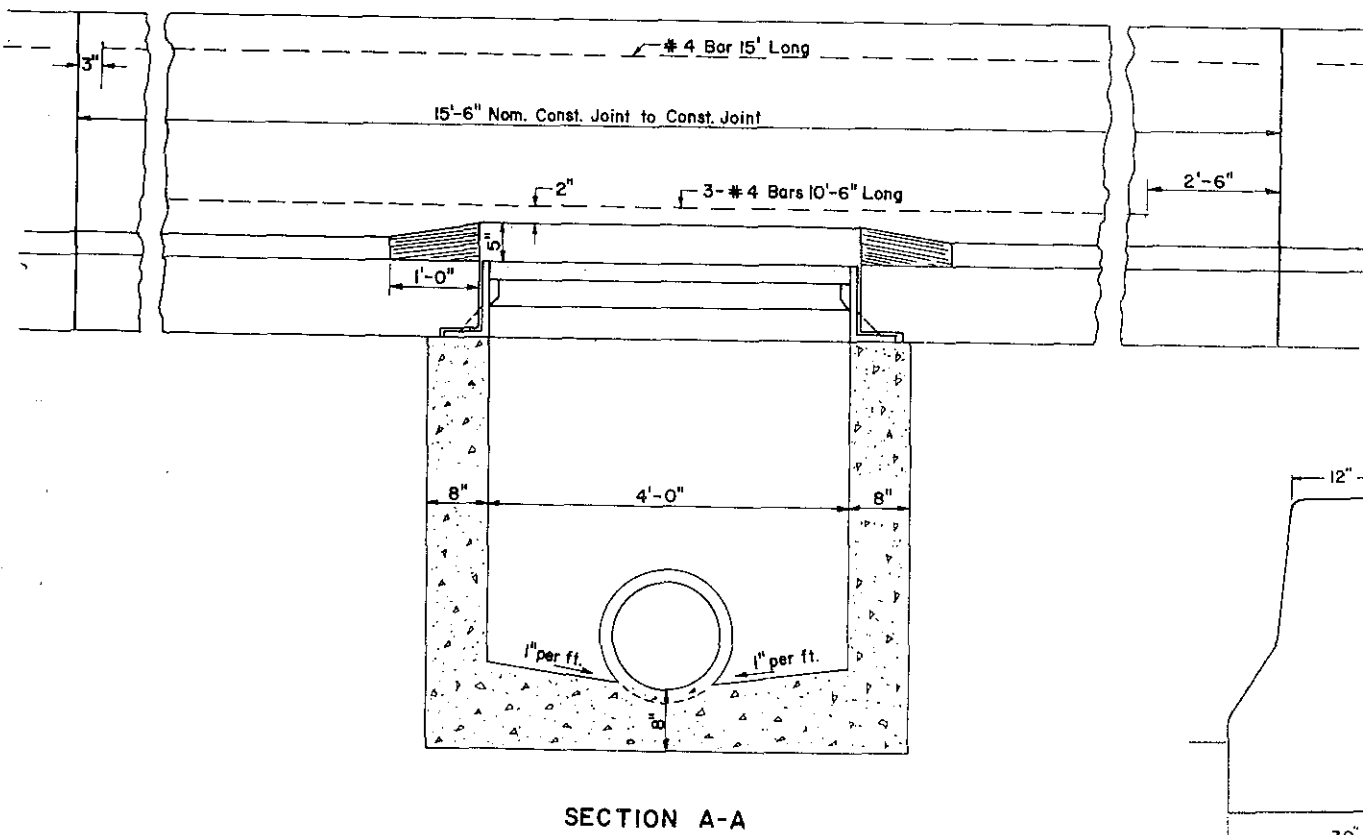
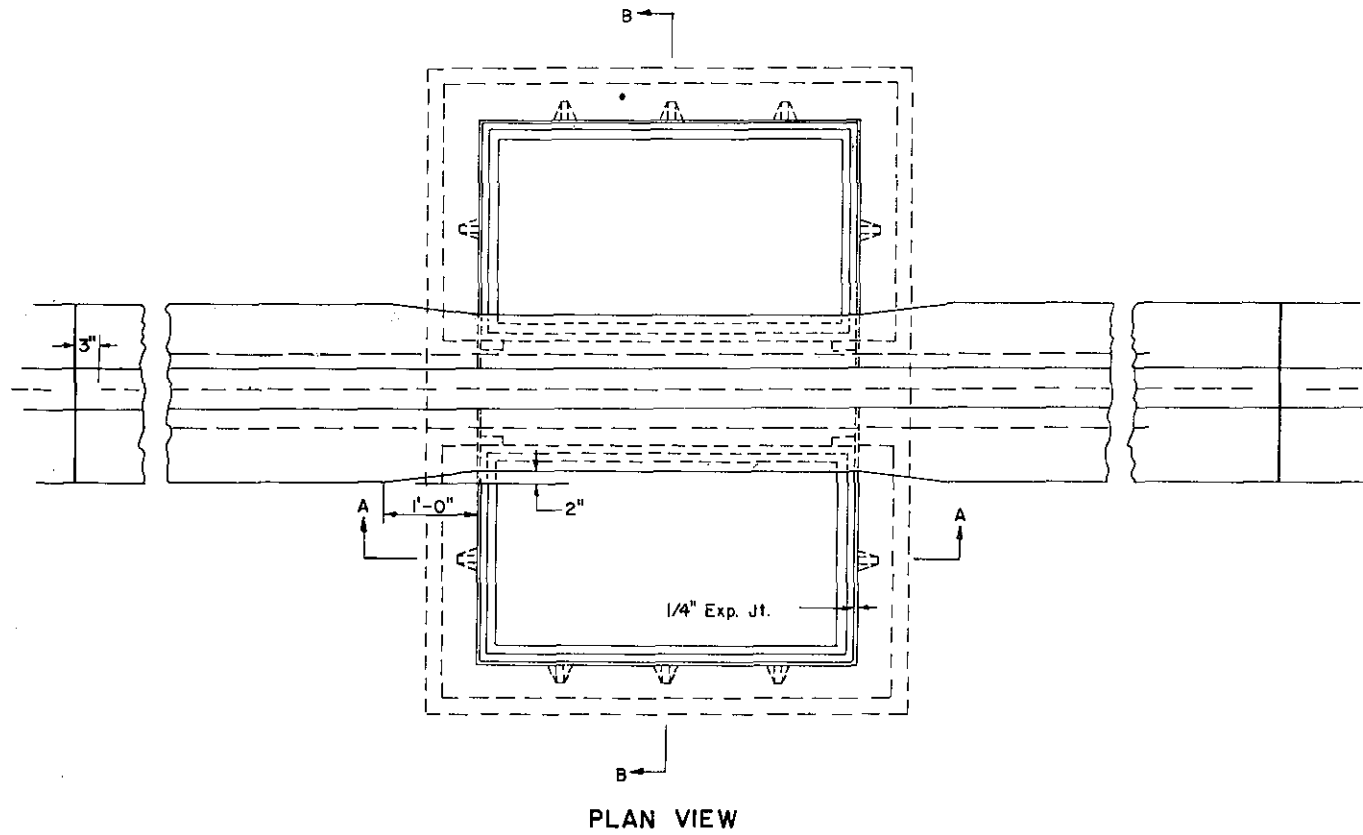
SHEET 4 OF 4

MB-2

TRACED BY  
PINAL BY





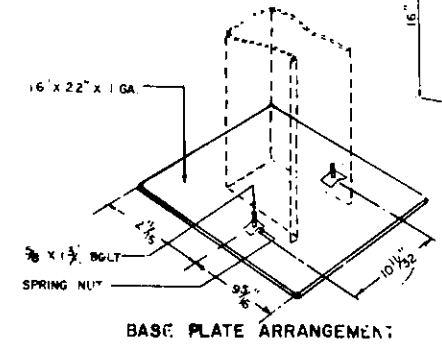
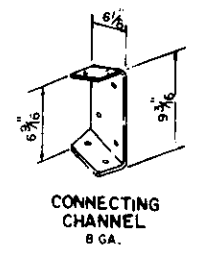
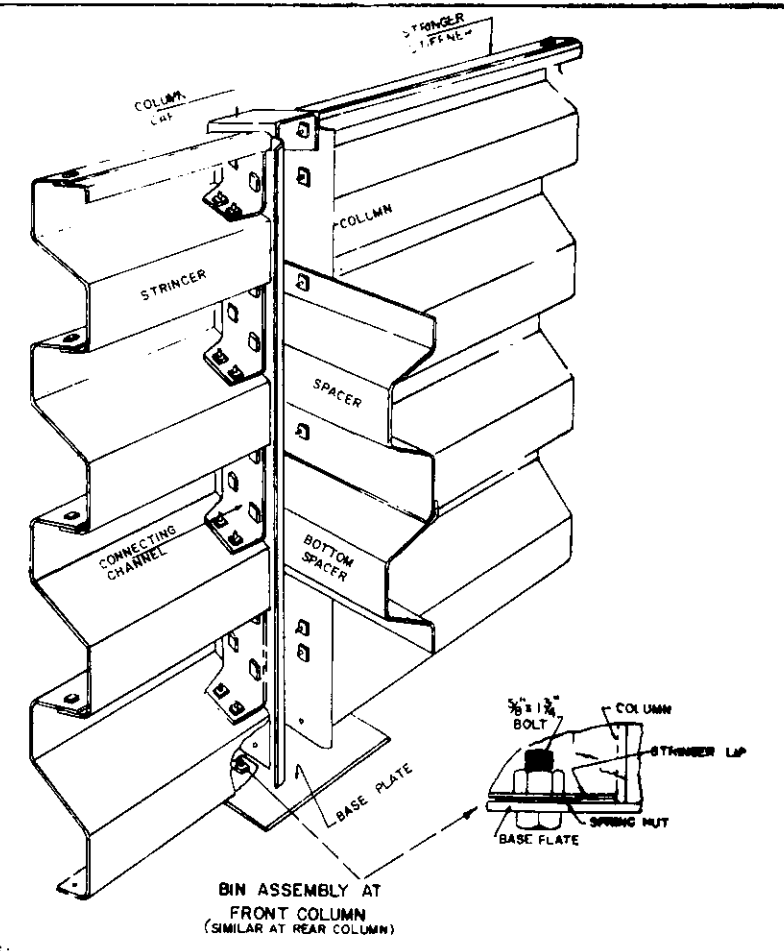
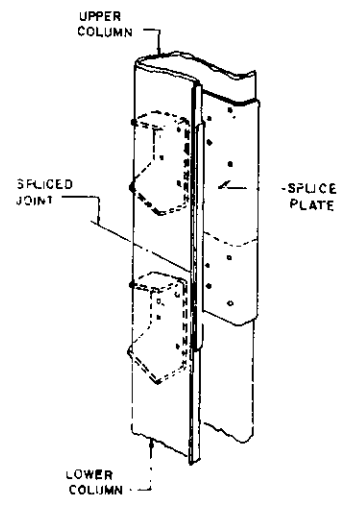
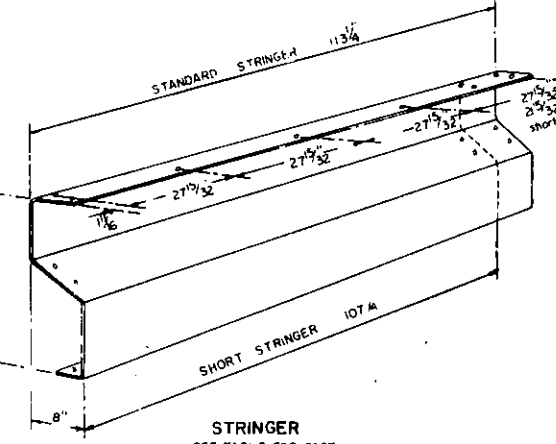
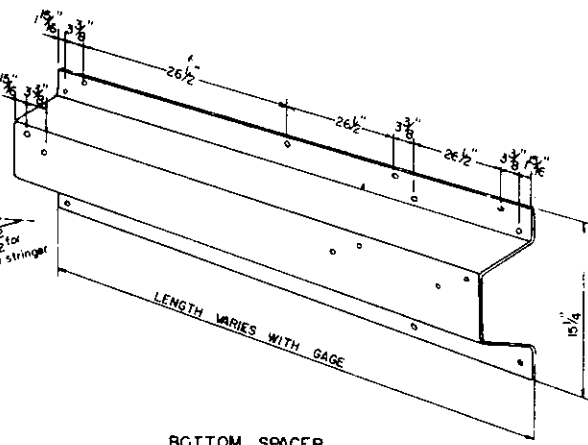
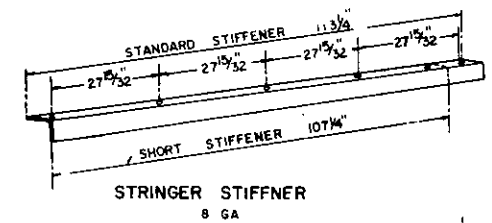
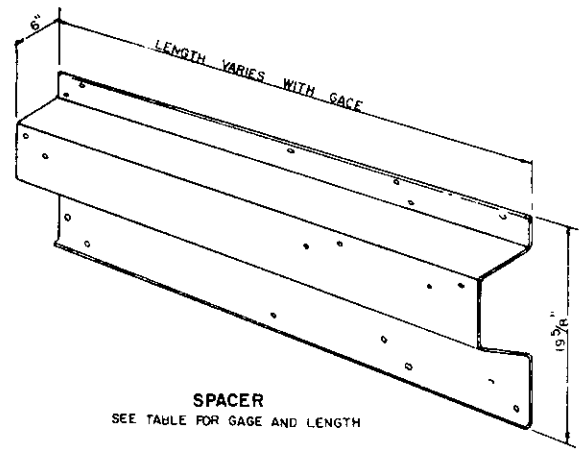
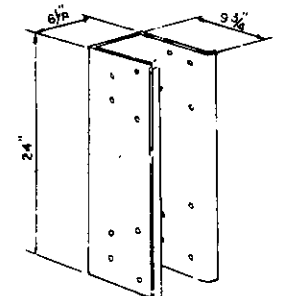
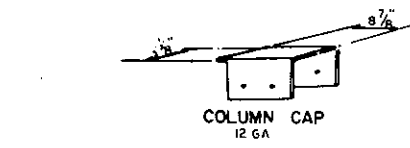


NOTES

1. Inlets to be constructed in barrier at the locations shown on the drawings.
2. Where inlets are located on super-elevated sections the inlet will be located on the low side of the section using one grate. The barrier construction will not change when one grate is used.
3. No additional compensation will be allowed for the added width in making transitions in concrete median barrier.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
CONCRETE MEDIAN BARRIER

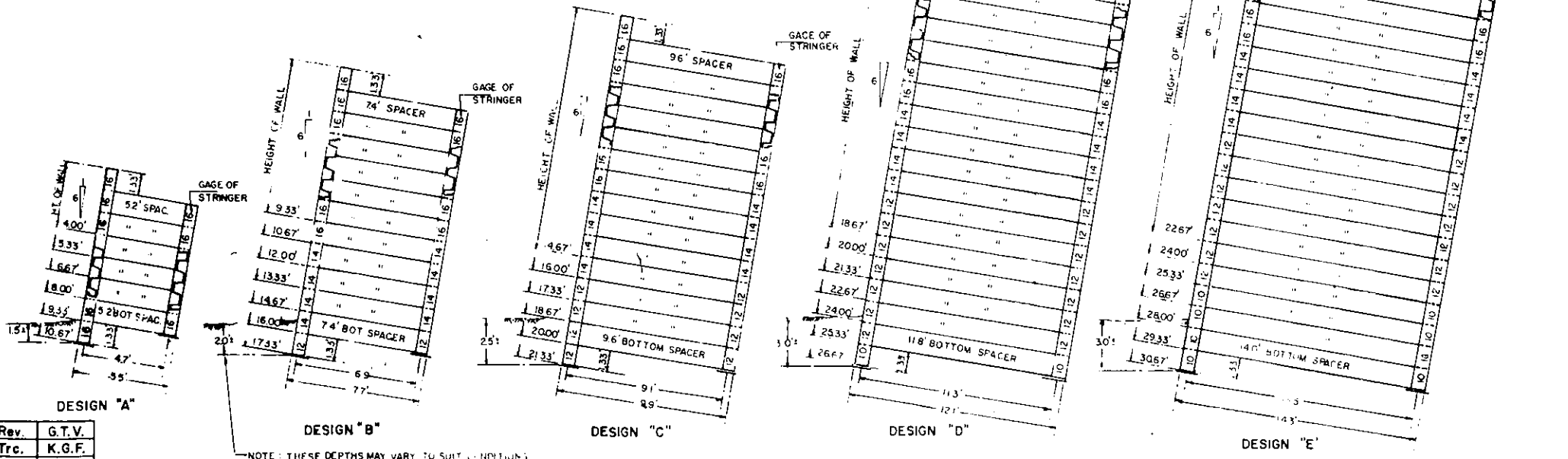
12/19/69  
11/26/68  
SHEET 2 OF 2  
MB-3



| DETAIL OF SPACERS |    |    |    |     |
|-------------------|----|----|----|-----|
| DESIGN            | A  | B  | C  | E   |
| GAGE              | 16 | 16 | 14 | 12  |
| LENGTH            | 52 | 74 | 86 | 118 |

**GENERAL NOTES:**

- All materials and workmanship shall be in accordance with PDH Form 408, Sec. 625
- All exposed interior and exterior metal sheets used to form the members of the closed face metal cribbing shall be coated by (A) or (B), when specified for Metal Cribbing-Coated:
  - (A) Coated on both sides with a layer of asbestos fibers applied in a sheet form by pressing it into a molten metallic bonding medium. Immediately after the metallic bond has solidified, the asbestos fibers shall be thoroughly saturated with a bituminous saturant. The finished sheets shall be of first class commercial quality free from blister and unsaturated spots.
  - (B) Galvanized on both sides by the hot dip process as specified in Section 625.2 (b) of Form 408, and field coated with bituminous materials, immediately prior to application of coating, galvanized surfaces are to be either sand blasted to lightly etch surfaces and to remove any greasy film present by blasting in accordance with Field Structures Painting Council Specification No. 7, brush off blast cleaning or saturate all surfaces with vinegar (acetic acid) and when dry wipe off any bloom which has formed.
- Apply two (2) coats of coal tar based paint (Federal Specification MIL-18480). To be applied at the rate of 55-70 square feet per gallon per coat. One coat of Coal Tar Emulsion to conform to Federal Specification MIL-C-15203 at the rate of 60 square feet per gallon. Twenty four hours drying time to be allowed between coats.
- Metal base plates will be required.



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

METAL CRIBBING-COATED

APPROVED *February 5, 1968*

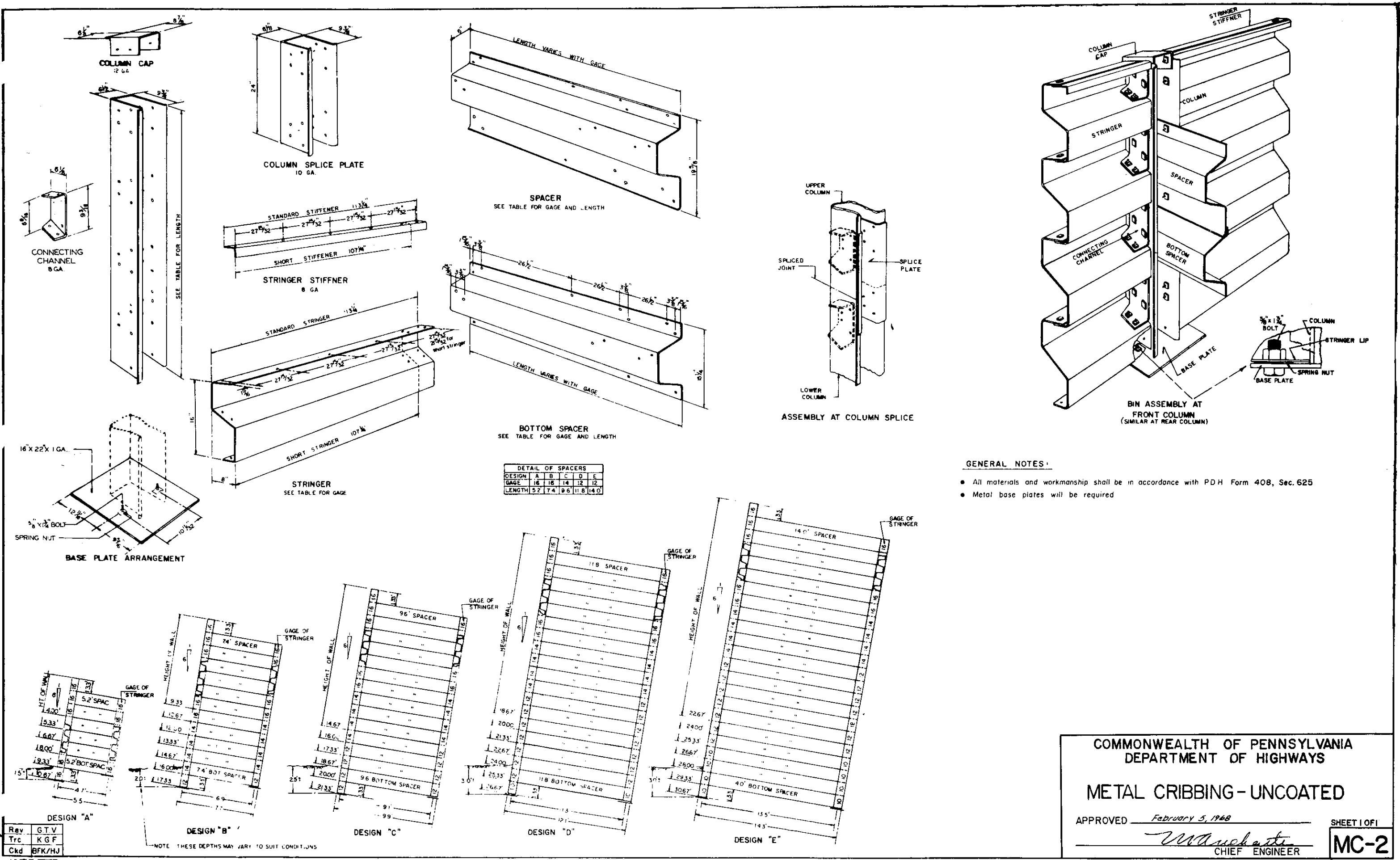
*[Signature]*  
CHIEF ENGINEER

SHEET 1 OF 1

MC-1

|      |        |
|------|--------|
| Rev. | G.T.V. |
| Trc. | K.G.F. |
| Ckd. | BFK/HJ |

NOTE: THESE DEPTHS MAY VARY TO SUIT CONDITIONS



**GENERAL NOTES:**

- All materials and workmanship shall be in accordance with PDH Form 408, Sec. 625
- Metal base plates will be required

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

METAL CRIBBING - UNCOATED

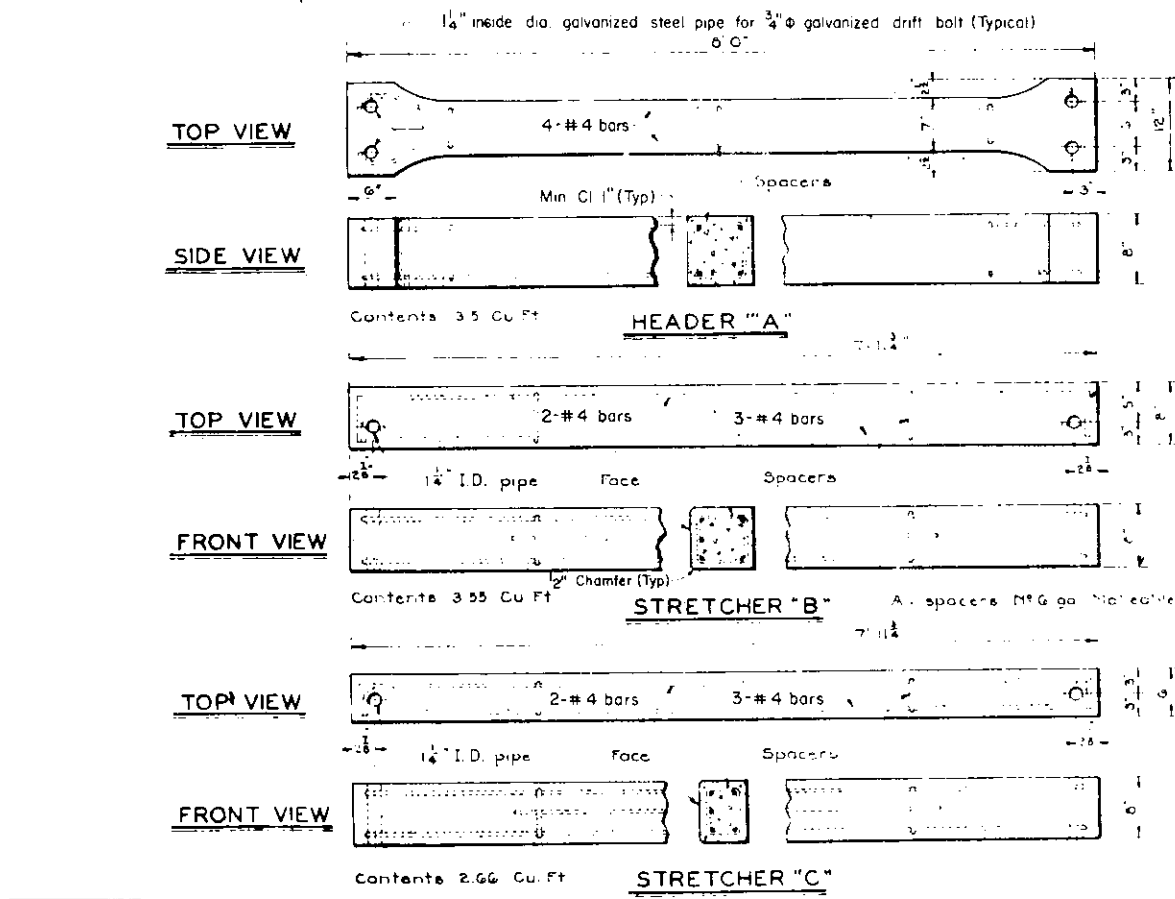
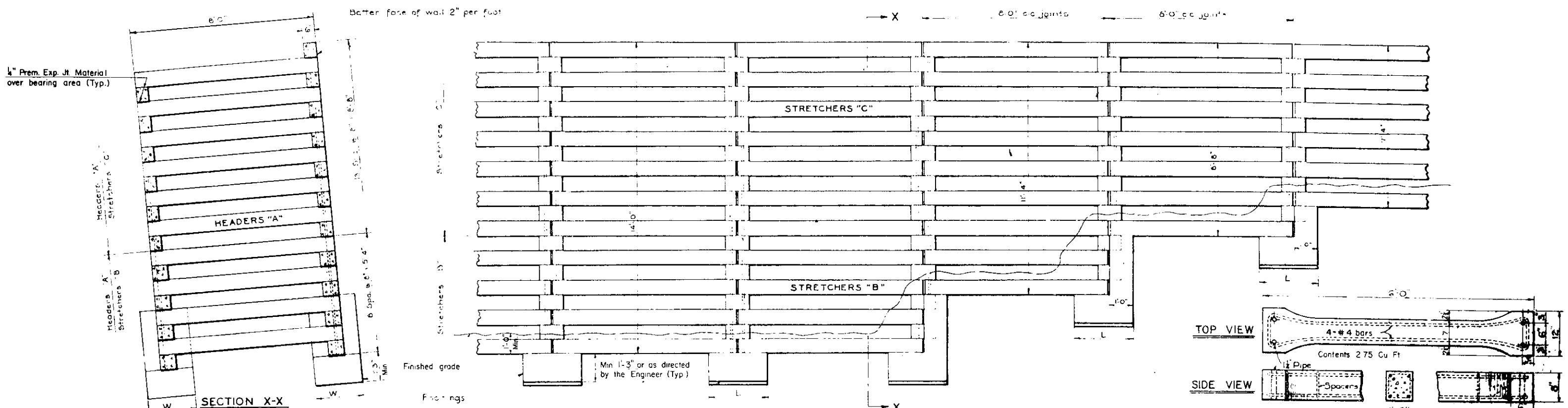
APPROVED February 5, 1968

*W. M. Schaefer*  
CHIEF ENGINEER

SHEET 1 OF 1  
**MC-2**

|     |        |
|-----|--------|
| Rev | GTV    |
| Trc | KGF    |
| Ckd | BFK/HJ |

NOTE: THESE DEPTHS MAY VARY TO SUIT CONDITIONS



**GENERAL NOTES:**

- All Materials and Workmanship shall be in accordance with P.C.I. Form 408, Section 625
- Concrete Crib members shall be Class "A" Concrete
- Footings shall be Class "B" Concrete.
- Where total height of cribbing is not more than 1'-4" use headers 4 ft long, and where total height of cribbing is between 0'-0" and 11'-4" use headers 6 ft long. For heights between 12'-0" and 15'-4" use headers 8 ft long. Higher cribbing walls to be of special design.
- All stretchers to have letter "F" plainly impressed in the face to indicate the exposed surface in the finished wall
- Batter of wall other than 2" in 12" subject to approval by the Engineer.
- If approved by the Engineer, other types of Concrete Cribbing design may be used.
- Footings may be ordered by the Engineer to be at any elevation or of any dimensions necessary to provide a proper foundation.
- Reinforcement bars shall be of intermediate or hard grade or rail steel designed for  $f_s = 20,000$  psi and detailed in accordance with ACI Code.

| TYPE OF SOIL | SAFE BEARING PRESSURE TONS/SQ.FT. | CRIBBING HEIGHT 14'-0"         |                                | CRIBBING HEIGHT 11'-4"         |                                | CRIBBING HEIGHT 8'-8"          |               |
|--------------|-----------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------|
|              |                                   | FRONT (W x L)                  | REAR (W x L)                   | FRONT (W x L)                  | REAR (W x L)                   | FRONT (W x L)                  | REAR (W x L)  |
| Rock         | 20                                | None                           | None                           | None                           | None                           | None                           | None          |
| Shale        | 10                                | 2'-0" x 2'-6"                  | "                              | 2'-0" x 2'-6"                  | "                              | 2'-0" x 2'-6"                  | "             |
| Gravel       | 8                                 | 2'-0" x 2'-6"                  | "                              | 2'-0" x 2'-6"                  | "                              | 2'-0" x 2'-6"                  | "             |
| Clay (Dry)   | 5                                 | 2'-0" x 2'-6"                  | "                              | 2'-0" x 2'-6"                  | "                              | 2'-0" x 2'-6"                  | "             |
| Clay (Moist) | 2                                 | 2'-0" x 8'-0" or 1'-4" x 8'-0" | 2'-0" x 8'-0" or 1'-6" x 8'-0" | 2'-0" x 8'-0" or 1'-4" x 8'-0" | 2'-0" x 8'-0" or 1'-6" x 8'-0" | 2'-6" x 2'-6"                  | "             |
| Clay (Soft)  | 1                                 | 2'-9" x 8'-0"                  | 2'-6" x 8'-0"                  | 2'-9" x 8'-0"                  | 2'-0" x 8'-0"                  | 2'-0" x 4'-0" or 1'-6" x 8'-0" | 3'-0" x 3'-0" |
| Loam         | 1                                 | 2'-9" x 8'-0"                  | 2'-6" x 8'-0"                  | 2'-9" x 8'-0"                  | 2'-0" x 8'-0"                  | "                              | 3'-0" x 3'-0" |

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

CONCRETE CRIBBING - TYPE I

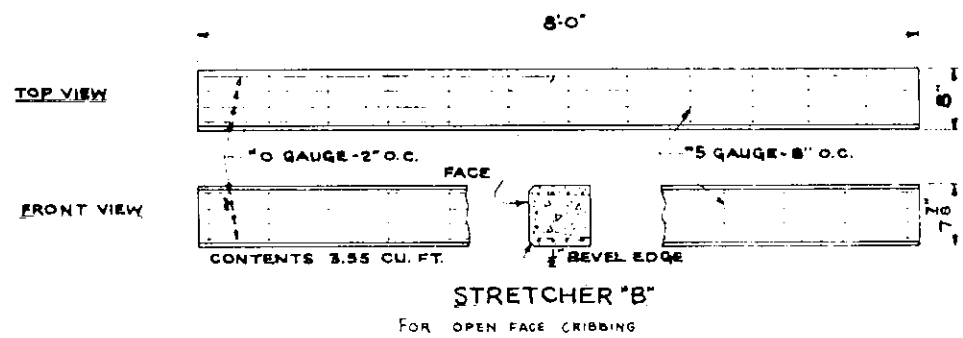
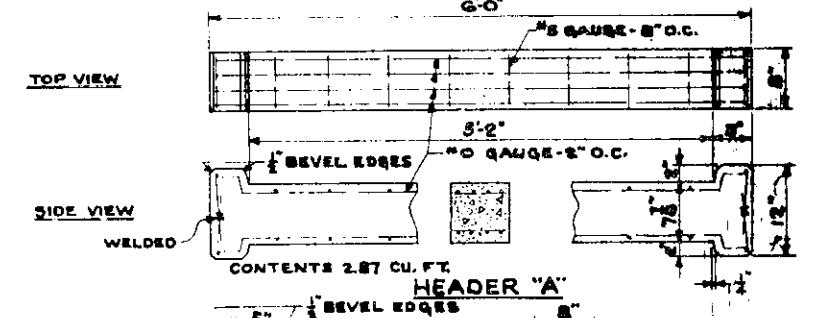
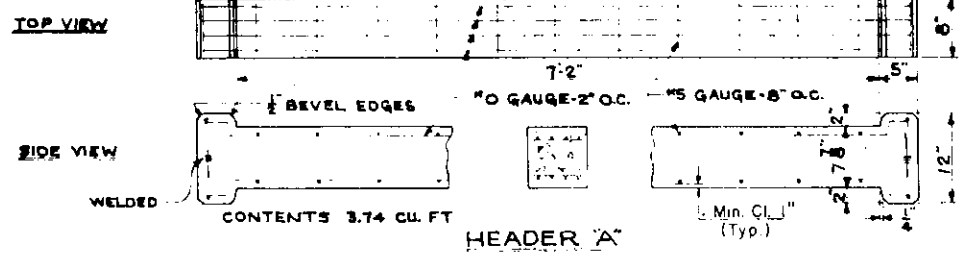
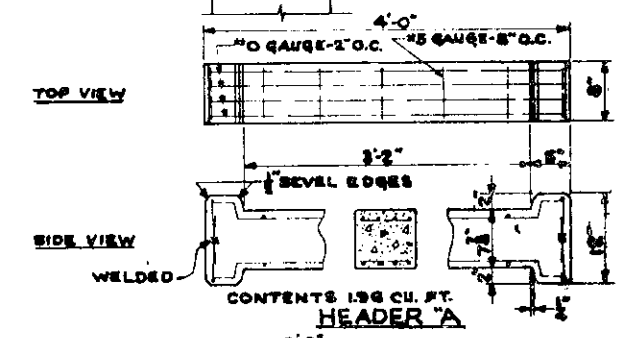
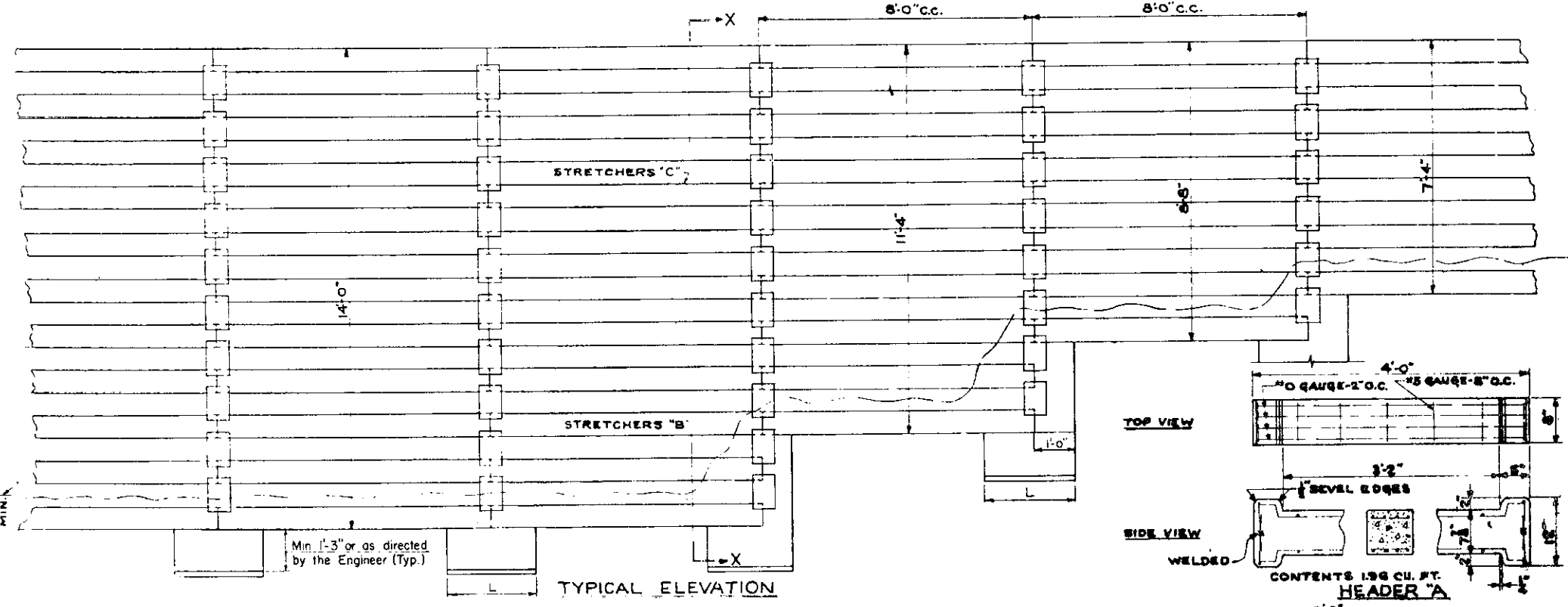
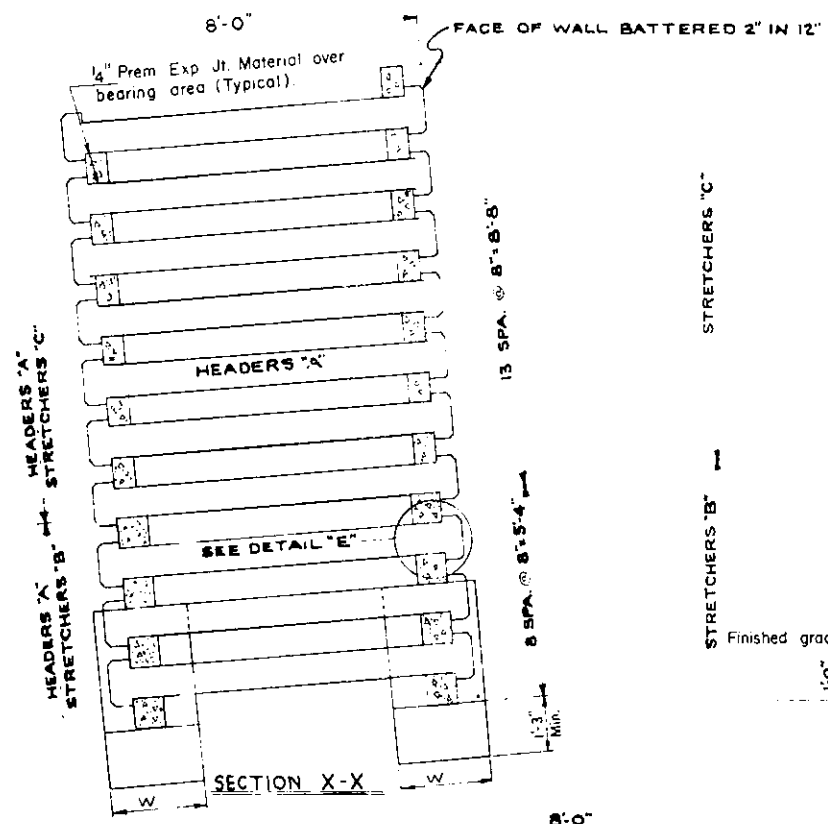
APPROVED February 3, 1948

*W. L. ...*  
CHIEF ENGINEER

SHEET 1 OF 2

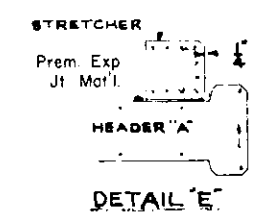
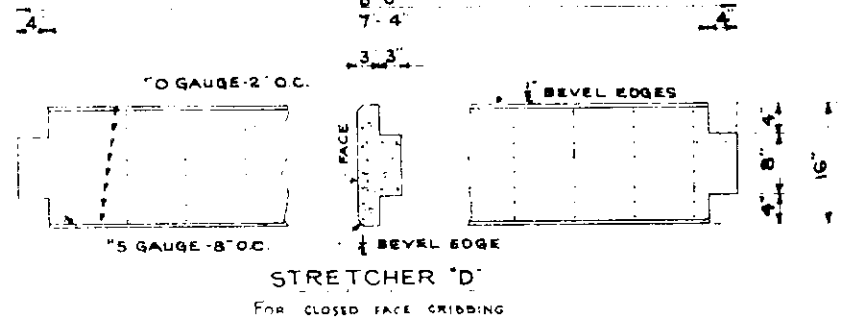
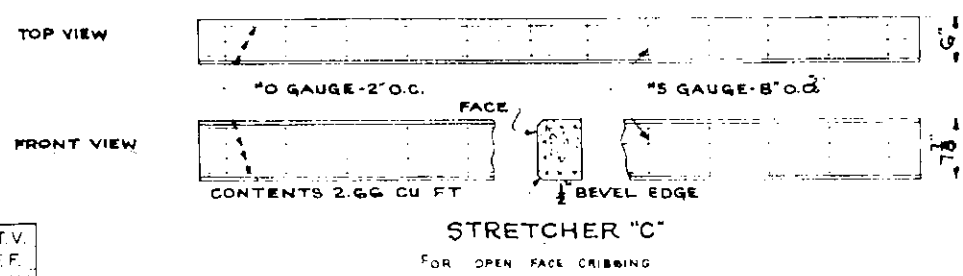
CC-1

|      |        |
|------|--------|
| Rev. | G.T.V. |
| Trc. | F.F.F. |
| Ckd. | BFK/HJ |



- NOTES:**
- For General Notes refer to Sheet 1.
  - Closed face cribbing wall shall be used only if specified.
  - Steel wire reinforcement shall conform to ASTM Designation A82.

| TYPE OF SOIL | SAFE BEARING PRESSURE TONS/SQ.FT. | CRIBBING HEIGHT 14'-0"         |               | CRIBBING HEIGHT 11'-4"         |               | CRIBBING HEIGHT 8'-8"          |               |
|--------------|-----------------------------------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|---------------|
|              |                                   | FOOTING SIZE                   |               | FOOTING SIZE                   |               | FOOTING SIZE                   |               |
|              |                                   | FRONT (W x L)                  | REAR (W x L)  | FRONT (W x L)                  | REAR (W x L)  | FRONT (W x L)                  | REAR (W x L)  |
| ROCK         | 20                                | NONE                           | NONE          | NONE                           | NONE          | NONE                           | NONE          |
| SHALE        | 10                                | 2'-0" x 2'-6"                  | "             | 2'-0" x 2'-6"                  | "             | 2'-0" x 2'-6"                  | "             |
| GRAVEL       | 8                                 | 2'-0" x 2'-6"                  | "             | 2'-0" x 2'-6"                  | "             | 2'-0" x 2'-6"                  | "             |
| CLAY (DRY)   | 5                                 | 2'-0" x 2'-6"                  | "             | 2'-0" x 2'-6"                  | "             | 2'-0" x 2'-6"                  | "             |
| CLAY (MOIST) | 2                                 | 2'-0" x 8'-0" or 3'-6" x 8'-0" | 1'-4" x 8'-0" | 3'-0" x 4'-0" or 1'-6" x 8'-0" | 3'-0" x 3'-0" | 2'-6" x 2'-6"                  | "             |
| CLAY (SOFT)  | 1                                 | 3'-9" x 8'-0"                  | 2'-6" x 8'-0" | 2'-9" x 8'-0"                  | 2'-0" x 8'-0" | 3'-0" x 4'-0" or 1'-6" x 8'-0" | 3'-0" x 3'-0" |
| LOAM         | 1                                 | 3'-9" x 8'-0"                  | 2'-6" x 8'-0" | 2'-9" x 8'-0"                  | 2'-0" x 8'-0" | 3'-0" x 4'-0" or 1'-6" x 8'-0" | 3'-0" x 3'-0" |



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS

CONCRETE CRIBBING - TYPE II

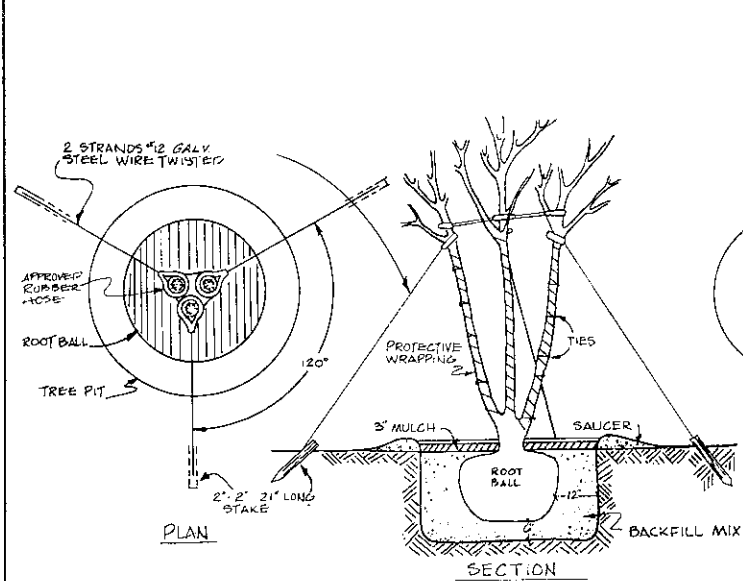
APPROVED February 5, 1968

*W. J. ...*  
CHIEF ENGINEER

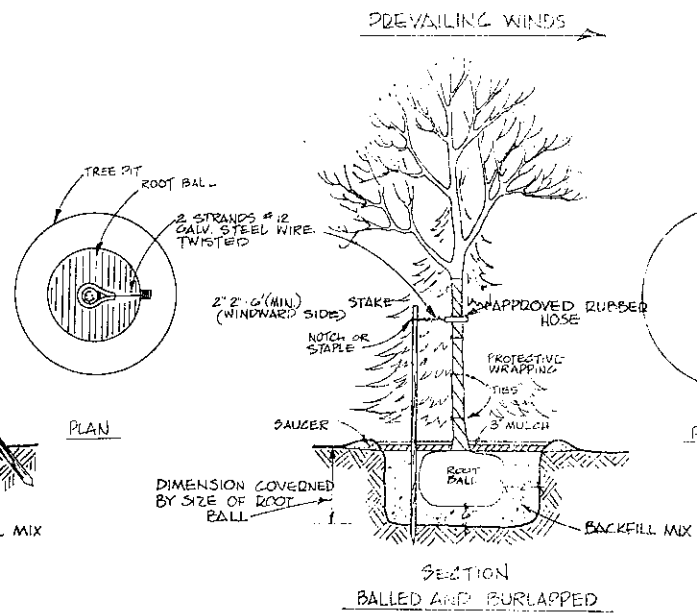
SHEET 2 OF 2

CC-1

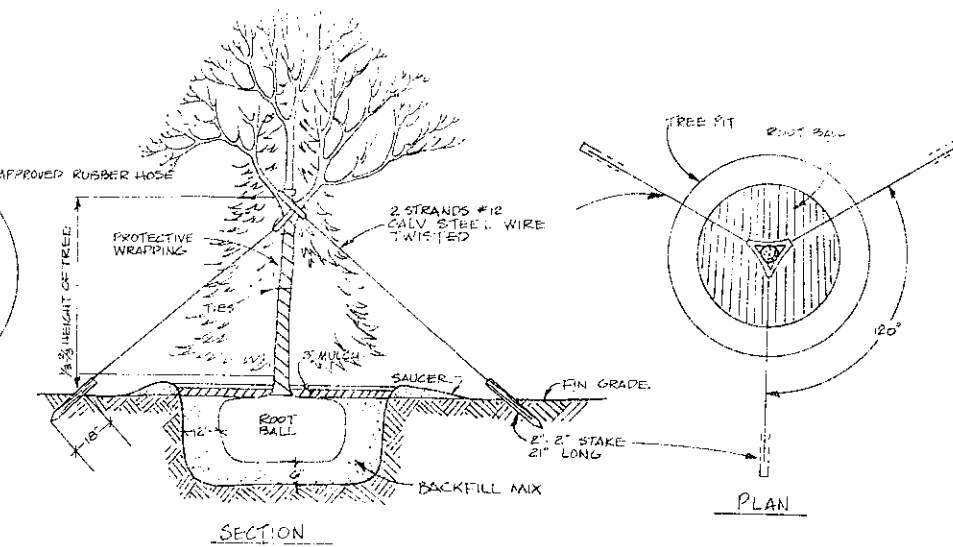
Rev. G.T.V.  
Trc. F.F.F.  
Ckd. BFK/HU



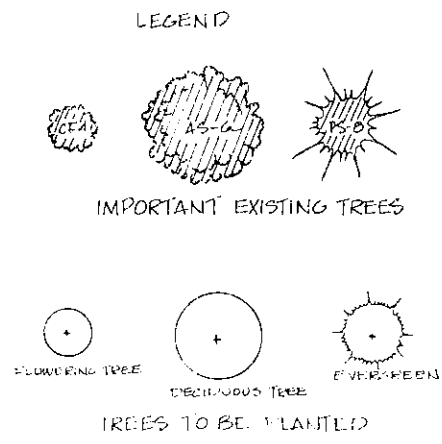
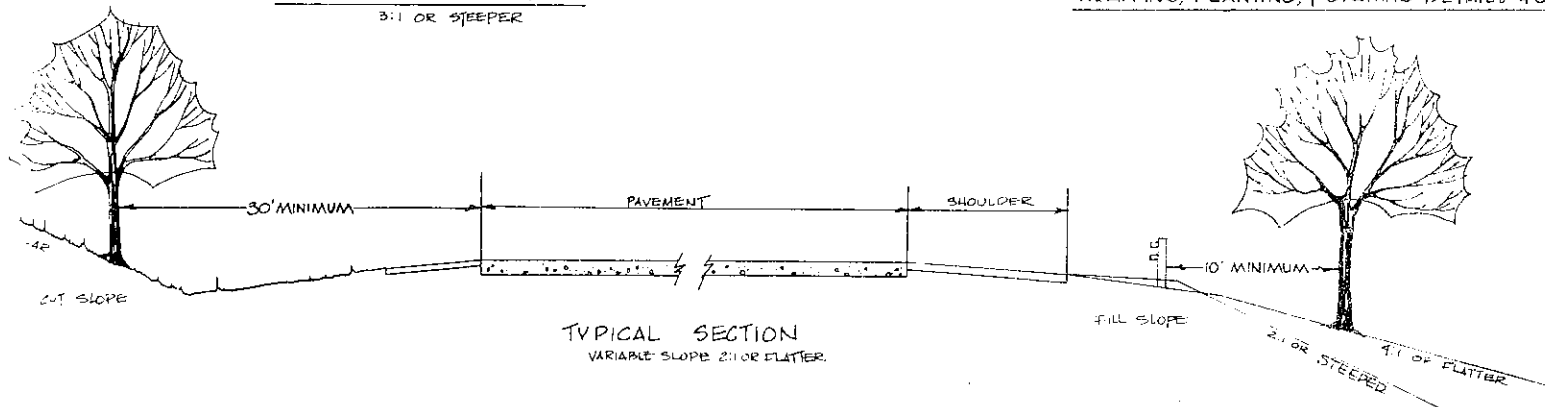
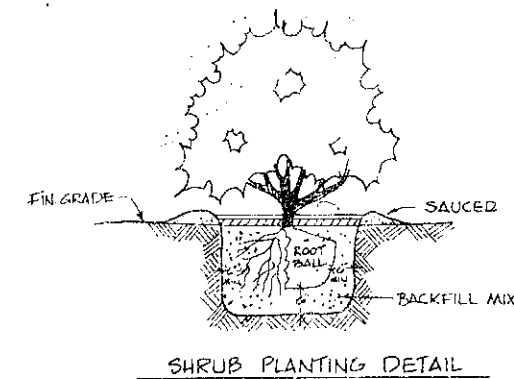
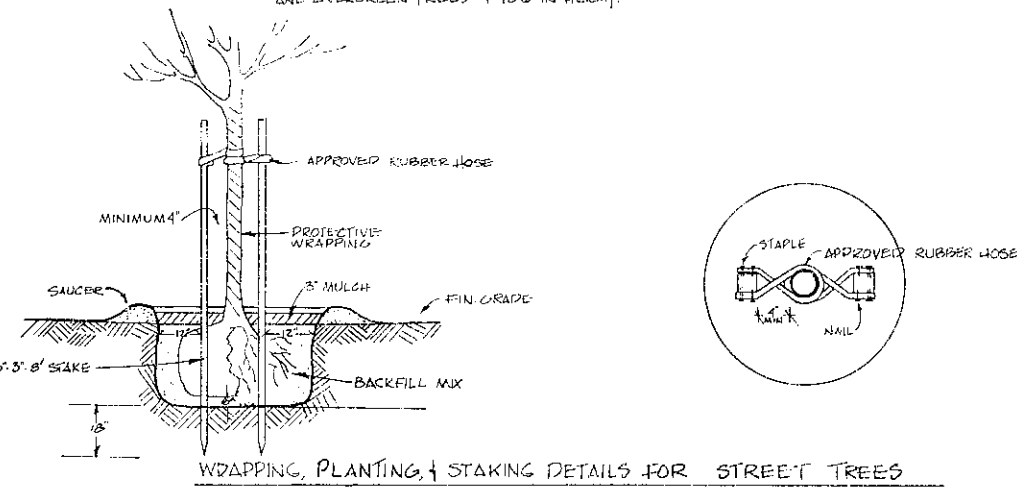
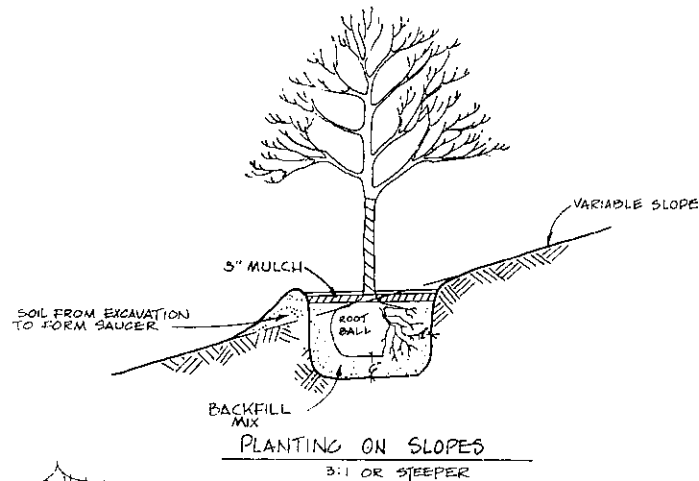
PLANTING, GUYING & WRAPPING DETAILS  
MULTI-STEM, DECIDUOUS TREES



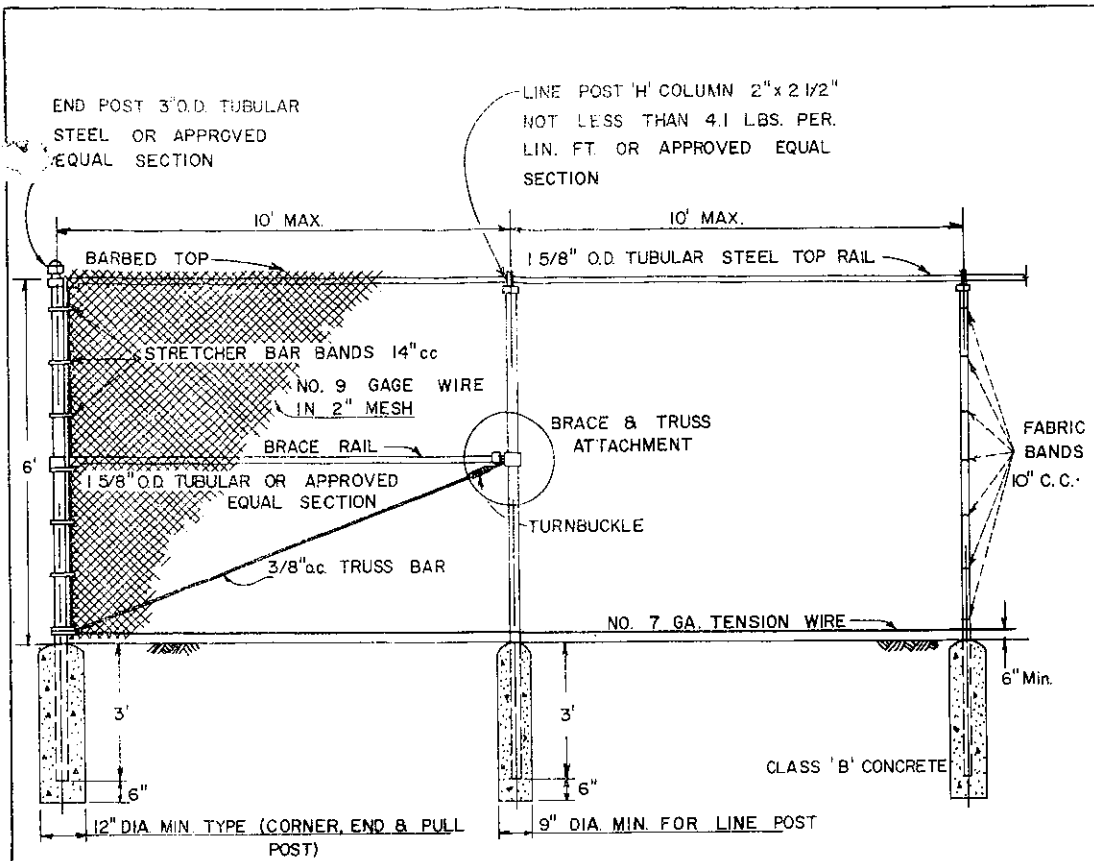
WRAPPING, PLANTING, & STAKING DETAILS FOR SMALL TREES  
DECIDUOUS TREES 6' AND OVER IN HEIGHT AND LESS THAN 1 1/2" IN CALIPER  
AND EVERGREEN TREES 4' TO 6' IN HEIGHT



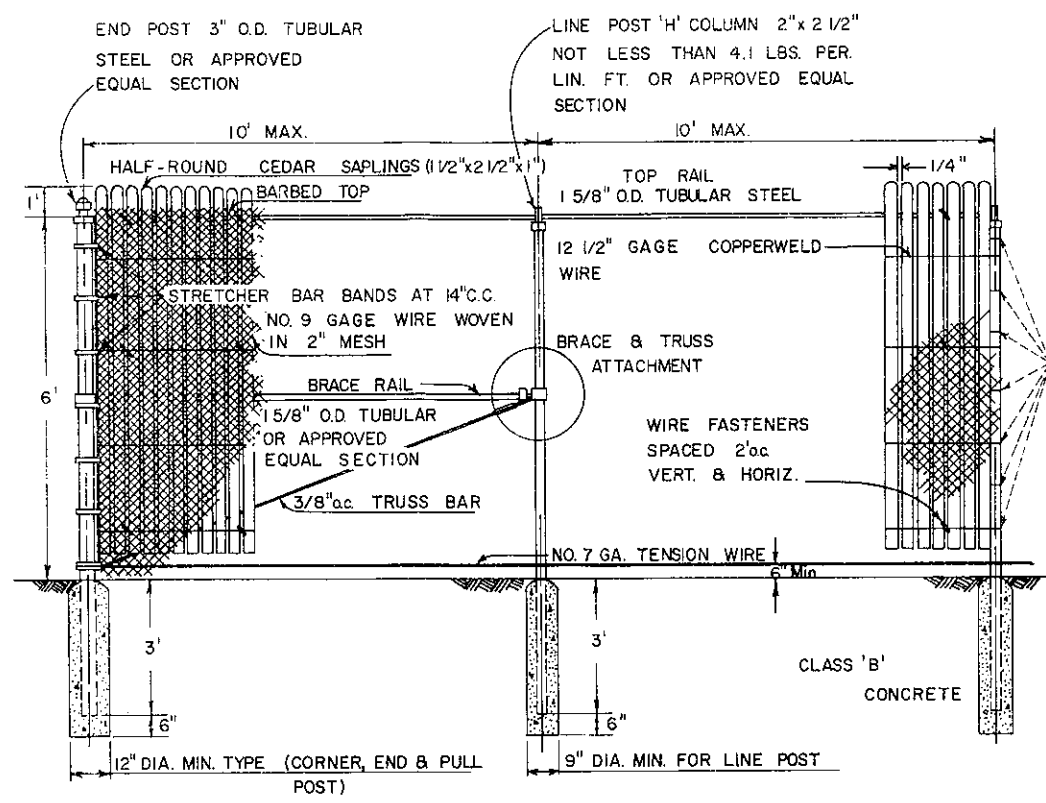
WRAPPING, PLANTING & GUYING DETAIL FOR LARGE TREES  
DECIDUOUS TREES 1 1/2" AND GREATER IN CALIPER  
AND EVERGREEN TREES 6' AND OVER IN HEIGHT



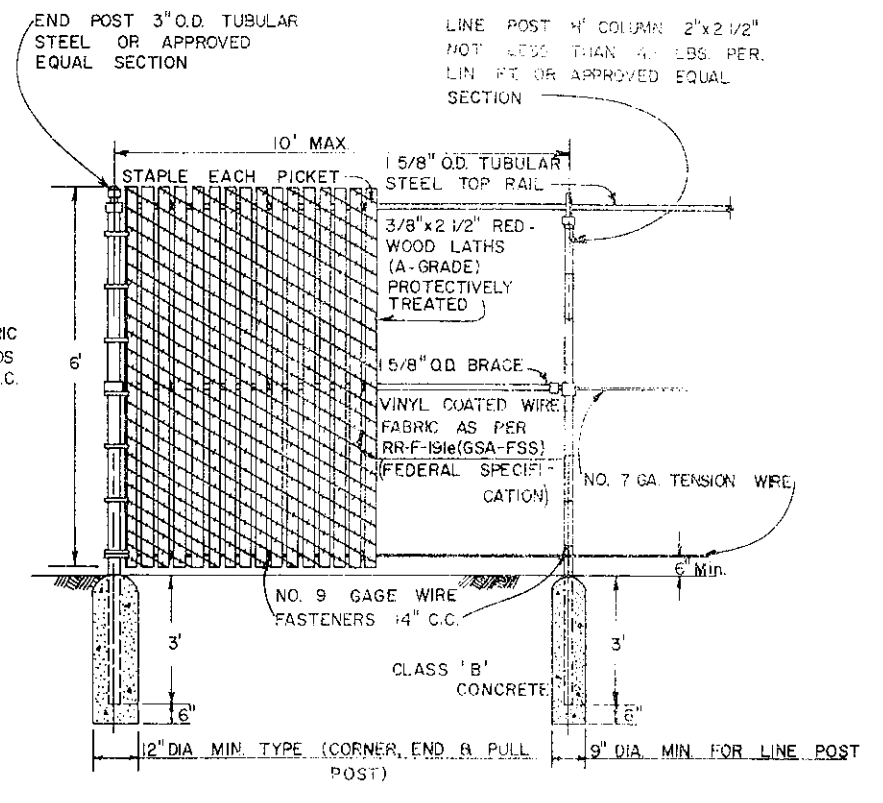
Revised for Planting Setbacks  
Approved \_\_\_\_\_ JAN. 5, 1969 \_\_\_\_\_  
CHIEF ENGINEER  
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
PLANTING GUIDES  
APPROVED \_\_\_\_\_ MAY 15, 1967 \_\_\_\_\_  
CHIEF ENGINEER  
SHEET OF LD-1



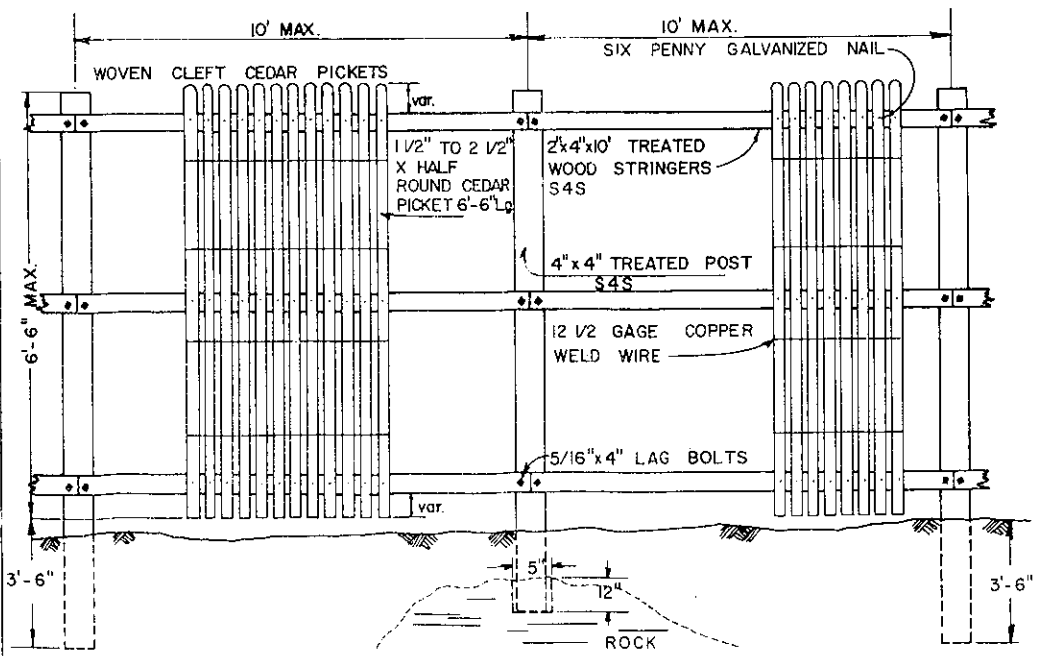
**TYPE - A**  
(CHAIN LINK WIRE FENCE)



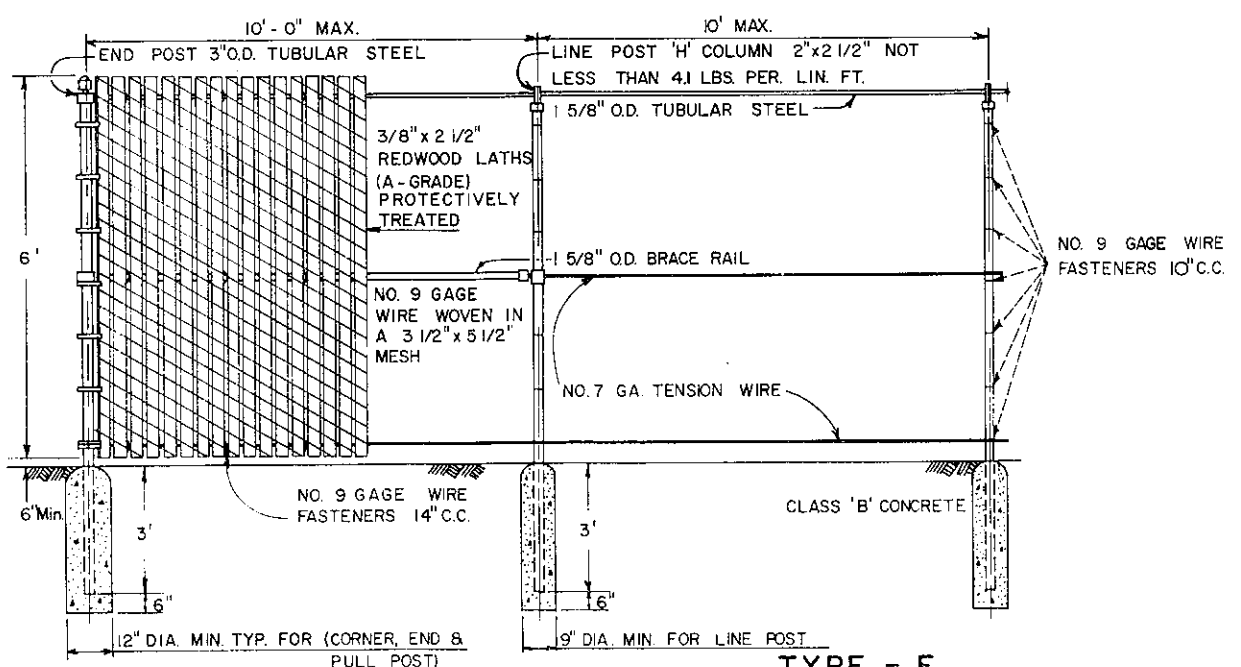
**TYPE - B**  
(CHAIN LINK WIRE FENCE WITH MOUNTED WOVEN  
CLEFT CEDAR PICKET FENCE)



**TYPE - C**  
(VINYL COATED CHAIN LINK FENCE  
WITH WOVEN REDWOOD PICKETS)



**TYPE - D**  
(WOVEN CLEFT CEDAR PICKET FENCE WITH  
WOOD FRAME MOUNTING)



**TYPE - E**  
(CHAIN LINK WIRE FENCE WITH WOVEN  
REDWOOD PICKETS)

Note: Clearance from Ground to Bottom of Picket to be 6" min. to 9" max for passage of debris

Note: For post heights exceeding 10', post shall be 6"x6"

NO SCALE

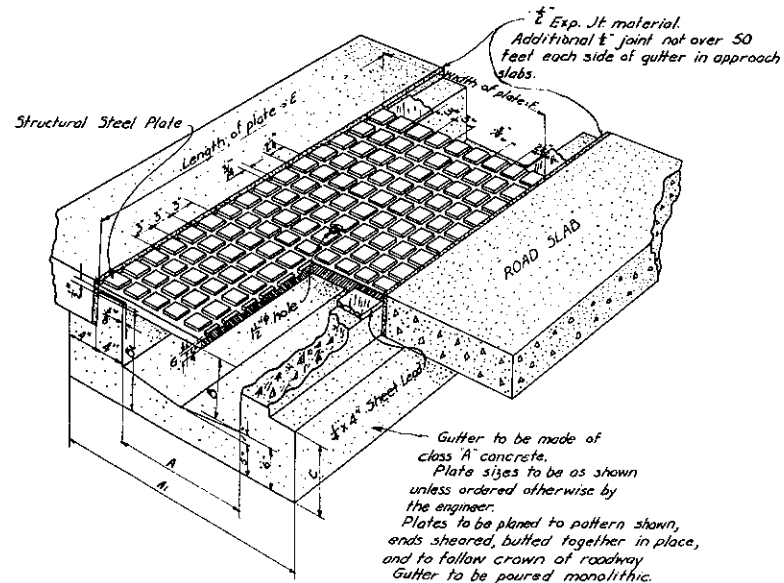
Revised for FASTENER Spacing  
Approved Jan. 6, 1969  
W. Anshutz  
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF HIGHWAYS  
ROADSIDE FENCE

APPROVED \_\_\_\_\_ SHEET OF \_\_\_\_\_  
W. Anshutz  
CHIEF ENGINEER

**LD-2**

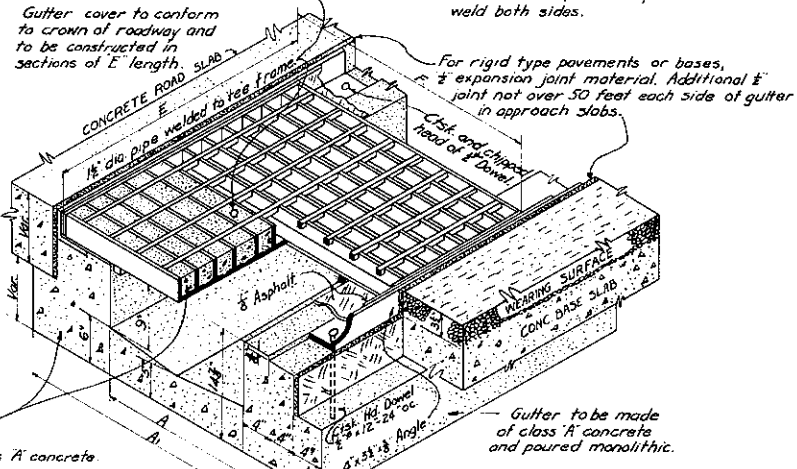
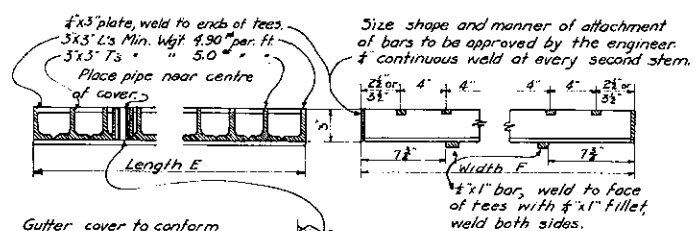




| Gutter Dimen. |    | Plate Dimen.   |                |        | Quantities per lin. ft. |     |        | Net Wgt.         |                 |            |              |     |
|---------------|----|----------------|----------------|--------|-------------------------|-----|--------|------------------|-----------------|------------|--------------|-----|
| A             | B  | A <sub>1</sub> | B <sub>1</sub> | C      | E                       | F   | G      | A Conc. Cu. Yds. | Excav. Cu. Yds. | Plate lbs. | 3 Plate lbs. |     |
| 12"           | 9" | 2 1/4"         | 15 1/4"        | 7 1/8" | 5'-0"                   | 20" | 1 1/8" | .062             | .165            | 9.81       | 54.6         | 273 |
| 18"           | 9" | 2'-0"          | 15 1/4"        | 7 1/8" | 4'-0"                   | 26" | 1 1/8" | .072             | .195            | 9.81       | 119.3        | 477 |
| 24"           | 9" | 3'-4"          | 15 1/4"        | 7 1/8" | 3'-0"                   | 32" | 1 1/8" | .081             | .224            | 9.81       | 163.7        | 491 |
| 30"           | 9" | 3'-10"         | 15 1/4"        | 8"     | 3'-0"                   | 38" | 2"     | .090             | .254            | 9.81       | 230.0        | 690 |

\* computed on basis of 9" pavement.

TYPE A FOR ROADWAY GUTTERS

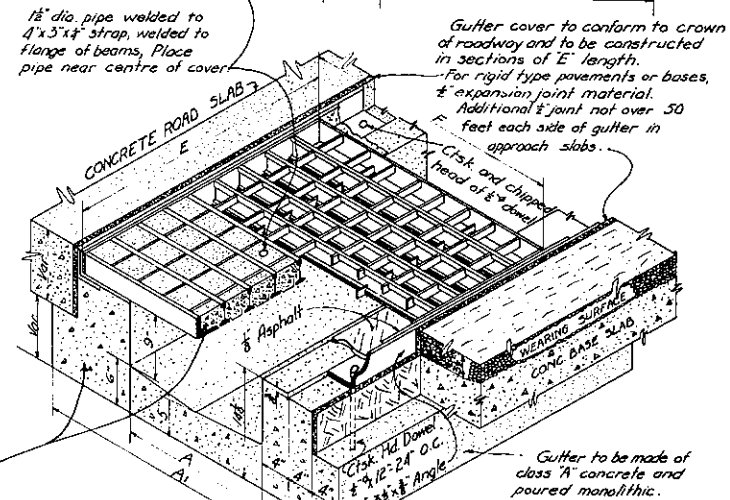
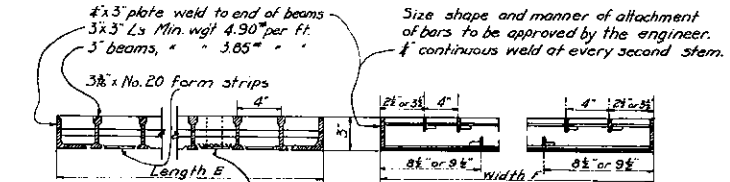


| Gutter Dimen. |                | Cover Dimen. |     | Quantities per lin. ft. |                 |         |
|---------------|----------------|--------------|-----|-------------------------|-----------------|---------|
| A             | A <sub>1</sub> | E            | F   | A Conc. Cu. Yds.        | Excav. Cu. Yds. | Sq. Ft. |
| 12"           | 3'-0"          | 4'-0"        | 27" | .096                    | .218            | 2.25    |
| 18"           | 3'-6"          | 4'-0"        | 33" | .106                    | .306            | 2.75    |
| 24"           | 4'-0"          | 3'-0"        | 39" | .115                    | .333            | 3.25    |
| 30"           | 4'-6"          | 3'-0"        | 45" | .121                    | .561            | 3.75    |

Gutter to be made of class A concrete and poured monolithic. Vibrated or tamped to satisfaction of Engineer. T-beam floor plates may be pre-moulded and ready to set in place.

\* Computed on basis of 9" pavement

TYPE B FOR ROADWAY GUTTERS

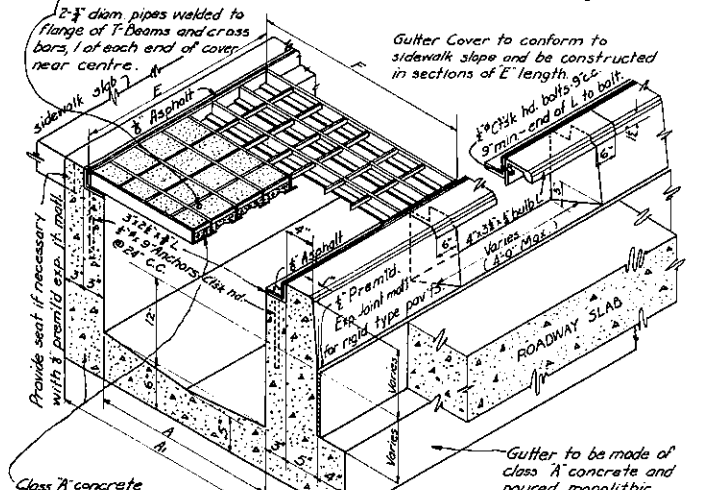
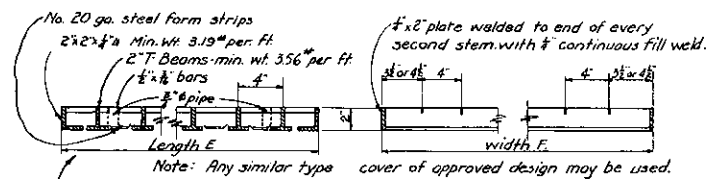


| Gutter Dimen. |                | Cover Dimen. |     | Quantities per lin. ft. |                 |         |
|---------------|----------------|--------------|-----|-------------------------|-----------------|---------|
| A             | A <sub>1</sub> | E            | F   | A Conc. Cu. Yds.        | Excav. Cu. Yds. | Sq. Ft. |
| 12"           | 3'-0"          | 4'-0"        | 27" | .096                    | .270            | 2.25    |
| 18"           | 3'-6"          | 4'-0"        | 33" | .104                    | .306            | 2.75    |
| 24"           | 4'-0"          | 3'-0"        | 39" | .115                    | .333            | 3.25    |
| 30"           | 4'-6"          | 3'-0"        | 45" | .121                    | .361            | 3.75    |

Gutter to be made of class A concrete and poured monolithic. Vibrated or tamped to satisfaction of Engineer. Covers may be pre-moulded and ready to set in place.

\* Computed on basis of 9" pavement

TYPE C FOR ROADWAY GUTTERS



| Gutter Dimen. |                | Cover Dimen. |     | Quantities per lin. ft. |                 |         |
|---------------|----------------|--------------|-----|-------------------------|-----------------|---------|
| A             | A <sub>1</sub> | E            | F   | A Conc. Cu. Yds.        | Excav. Cu. Yds. | Sq. Ft. |
| 12"           | 8'-6"          | 4'-0"        | 17" | .1189                   | .362            | 1.217   |
| 18"           | 9'-0"          | 4'-0"        | 23" | .1234                   | .402            | 1.917   |
| 24"           | 9'-6"          | 3'-0"        | 29" | .1319                   | .442            | 2.417   |
| 30"           | 10'-0"         | 3'-0"        | 35" | .1404                   | .482            | 2.917   |

Gutter to be made of class A concrete and poured monolithic. Vibrated or tamped to satisfaction of Engineer. Covers may be pre-moulded and ready to set in place.

TYPE D FOR SIDEWALK GUTTERS

Traced by C.S.

Approved Jan. 31, 1951  
E.E. Dransfield  
Bridge Engineer.

Commonwealth of Pennsylvania  
Department of Highways  
BRIDGE UNIT

METAL TYPE COVERED GUTTERS

